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GRINDING and FINISHING

OCTOBER · 1960

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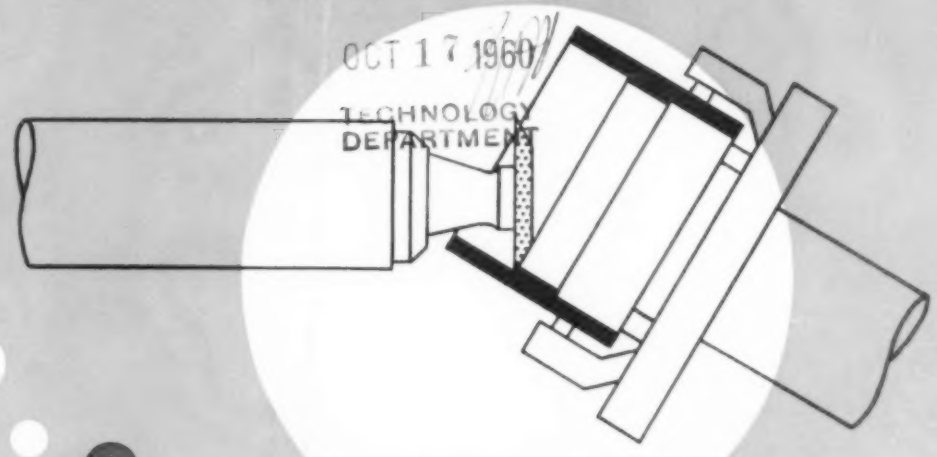
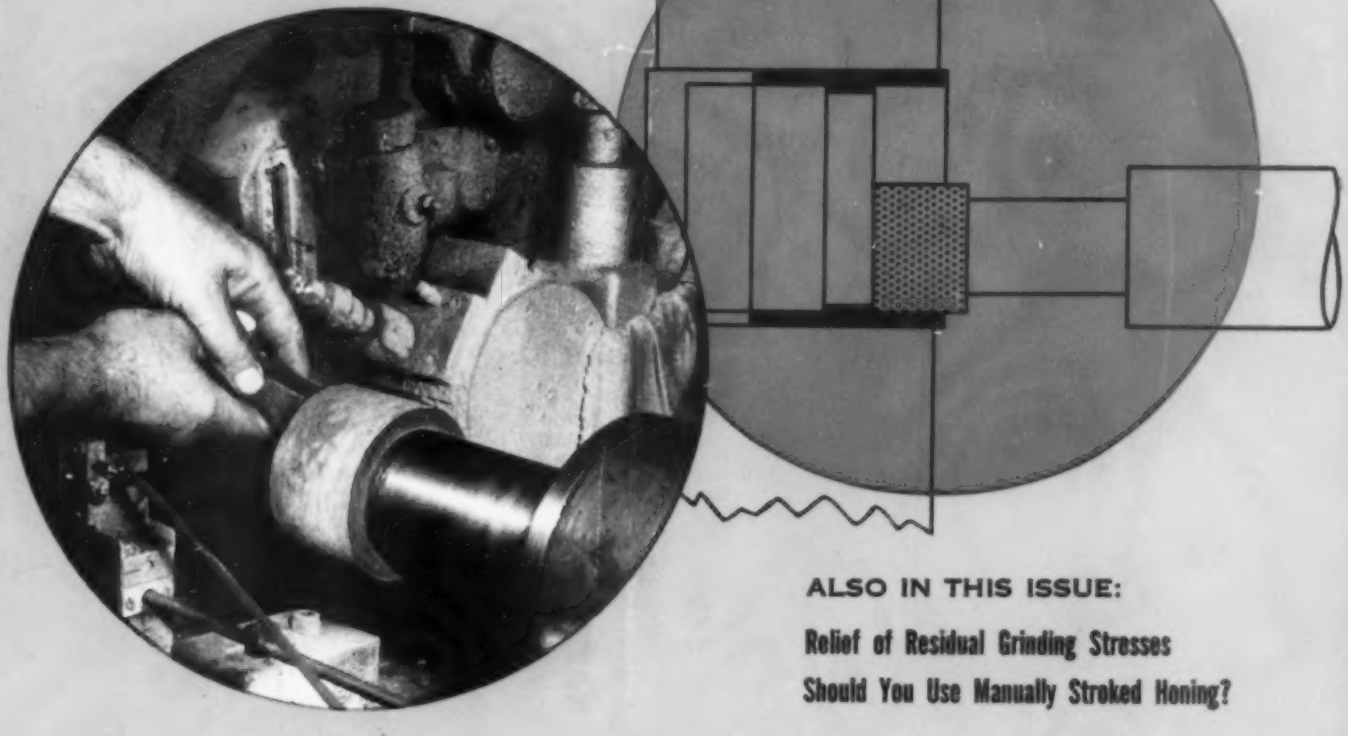




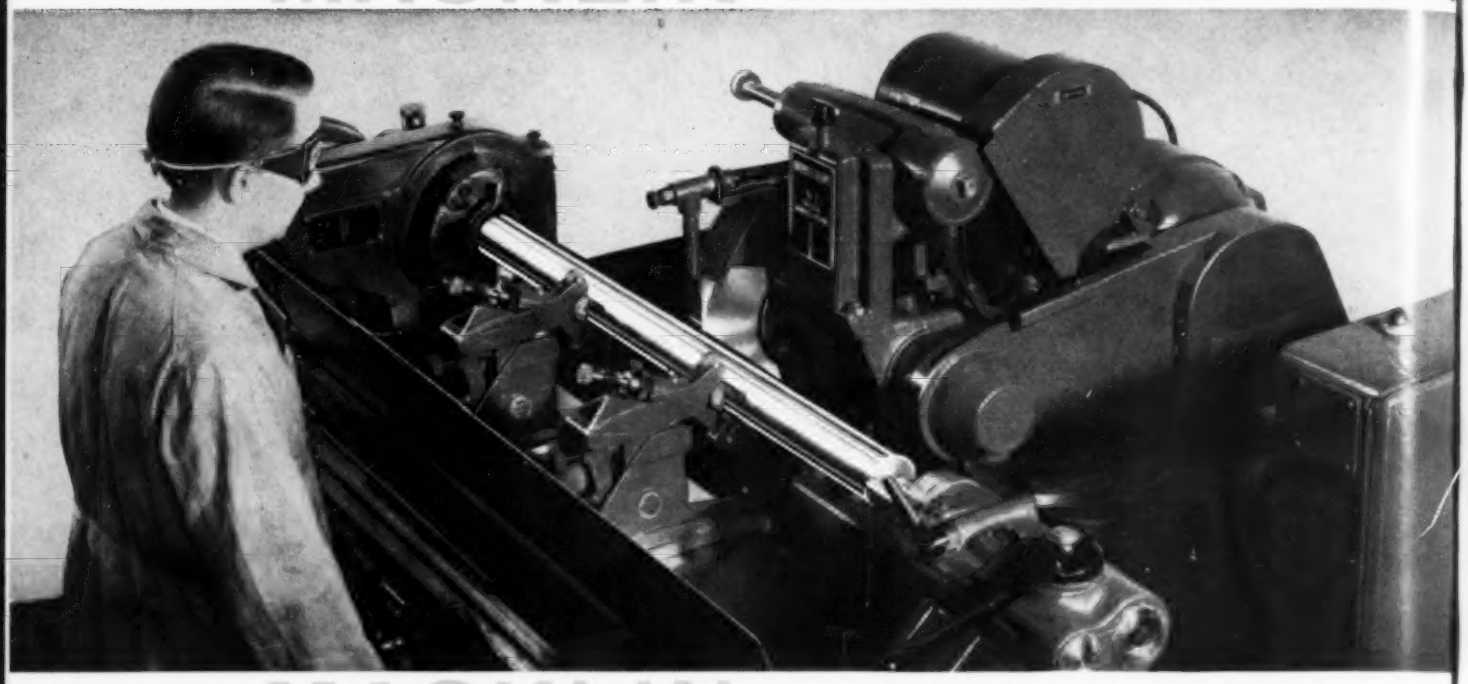
ALSO IN THIS ISSUE:

Relief of Residual Grinding Stresses

Should You Use Manually Stroked Honing?

SKF Doubles Production and Cuts Costs

In cylindrical grinding, too, for production, precision, and econo my



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WHEREVER ABRASIVE OPERATIONS ARE PERFORMED

GRINDING and FINISHING

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October Cover: A photo and two sketches highlight some of the benefits of a change in wheel design on an internal grinding job at SKF. The sketch in white (above) shows the old design and set-up; the new wheel dressing method appears in the photograph, while the sketch in blue suggests the improvements which more than doubled the production rate, tripled stock removal, and cut wheel costs per unit from eight cents to three.

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How George Deickert upped grinding

Watchmakers have nothing on the builders of Marion power shovels as far as accuracy is concerned. Some of the shafts on Marion's biggest shovel (two full carloads in a single scoop!) have to be finished to a tolerance of ±.0004" on bearing surfaces.

The sheer size of these grinding jobs staggers the imagination too. The steel shafts run up to 12 ft. long and 14" in diameter so a tremendous amount of metal has to be removed and the grinding operation accounts for a substantial chunk of costs.

That's where an outstanding Tool Control Supervisor like Marion's George Deickert is worth his weight in dollar bills. His analysis of the situation showed five major deficiencies in the wheels used for the job and he wasted no time turning dissatisfaction into action. He called in Bay State Abrasive Specialist Dick Crofoot and went over the whole problem with him in detail. Crofoot went to work with the engineering staff at Westboro and came up with a specification that did both grinding and finishing *and* ensured: (1) 30% faster stock removal. (2) Excellent instead of poor size control . . . *easily within* the ± .0004" tolerance. (3) Consistent finish at 20 RMS. (4) 50% less dressing. (5) Greatly improved wheel life. (6) Consistent duplication of performance, wheel after wheel.

As George Deickert himself says: "This isn't the only job that Bay State has done well on for us. We have dozens of different types of grinding jobs . . . and we use a great many different types of wheels, including tool wheels. Bay State not only does a lot of jobs for us and does them well . . . they have also been able to duplicate excellent first performances with their follow-up wheels."

If your grinding operations . . . large, small or micro-miniature . . . are less than 100% efficient by current standards of abrasive technology, your Bay State distributor or direct representative is thoroughly trained and fully equipped to work out practical improvements for you. *Better grinding at lower cost . . . that is his business.*

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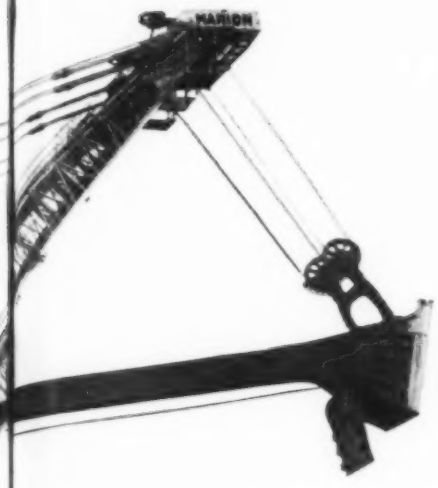
cavators ever built, Mar
Power Shovel Company's Ty
5761 "Stripmaster" can dig
cu. yards at a time, fill t
railroad cars with a sin
dipperful.

George Deickert, left, T
Control Supervisor, and M
vin A. Griffith, grinding m
chine operator — Mari
Power Shovel Co., Mari
Ohio — check progress
large, high carbon moly
denum steel shaft be
ground by a Bay State cyl
drical grinding wheel.

speed 30% and cut dressings by 50% at MARION POWER SHOVEL



George Deickert's background is impressive to put it mildly. His technical training started in Germany with a Masters Degree in steam and combustion engineering from Berlin University. His business career includes hitches with United Carbon Co., and Weston Instrument Co., in Newark, N. J. and fifteen years with Curtiss-Wright in Patterson, N. J. Starting as a Methods Engineer, he's been with Marion Power Shovel since 1947. He has used Bay State wheels since 1932 and says they have never let him down.

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Editor's Mail

Sam Safety

In the magazine "GRINDING & FINISHING" you are publishing a series of drawings about safety in use of grinding wheels entitled: "SAM SAFETY SAYS".

I very much appreciate the humor and style of such posters and would be glad if it was possible for me to get the ten of them.

Can you send them to me?

With thanks in anticipation,

I am,

Yours truly,
Alph. SEYMAT,
Conseil en Publicité
27, rue Eugènè Fournière
VILLEURBANNE, (Rhône).
FRANCE.

I read Mr. Patterson's editorial page in GRINDING and FINISHING for August and would be very much interested in receiving a sample set of Sams.

Yours truly,
T. U. Walker
Safety Administrator
Watertown Division
The New York Air Brake Co.
Watertown, New York

We're glad to fill both requests, as well as any others that may come in. If you'd like Sam's help in your grinding safety program, write to him c/o GRINDING and FINISHING, Wheaton, Illinois.

Sonic Wheel Grading

Please excuse this belated reply and thanks for publishing the short article about the Sonic Comparator on page 43 of the July issue of GRINDING and FINISHING. . .

You may have noticed that the table mentioned in the text of the article was omitted. This was brought to our attention by several readers.

Very truly yours,
Saturn Electronics Co.
R. G. Rowe
Niagara Falls,
New York

. . . As you no doubt have surmised, the table was omitted so that we could present the complete text; however, I must apologize for not correcting the copy accordingly.

We shall be glad to send the table to any reader who wishes to write in for it.

Japanese Machine Tool Market

With its metalworking industry 10 to 15 years behind America in know-how and methods, Japan offers a tremendous market for high-quality American machine tools and production equipment as its economy continues to boom. To tap this market, however, it will be necessary for American firms to send their best sales engineers to Japan for prolonged periods of time to show the Japanese where and how to use the modern American equipment to best advantage.

This piece of counsel was sounded by Jack Kleinoder, general manager of Volkert Stampings, Queens Village, N.Y., at the terminal conference in San Francisco of the U.S. Trade Mission to Japan, where he reported on the Japanese metalworking industry.

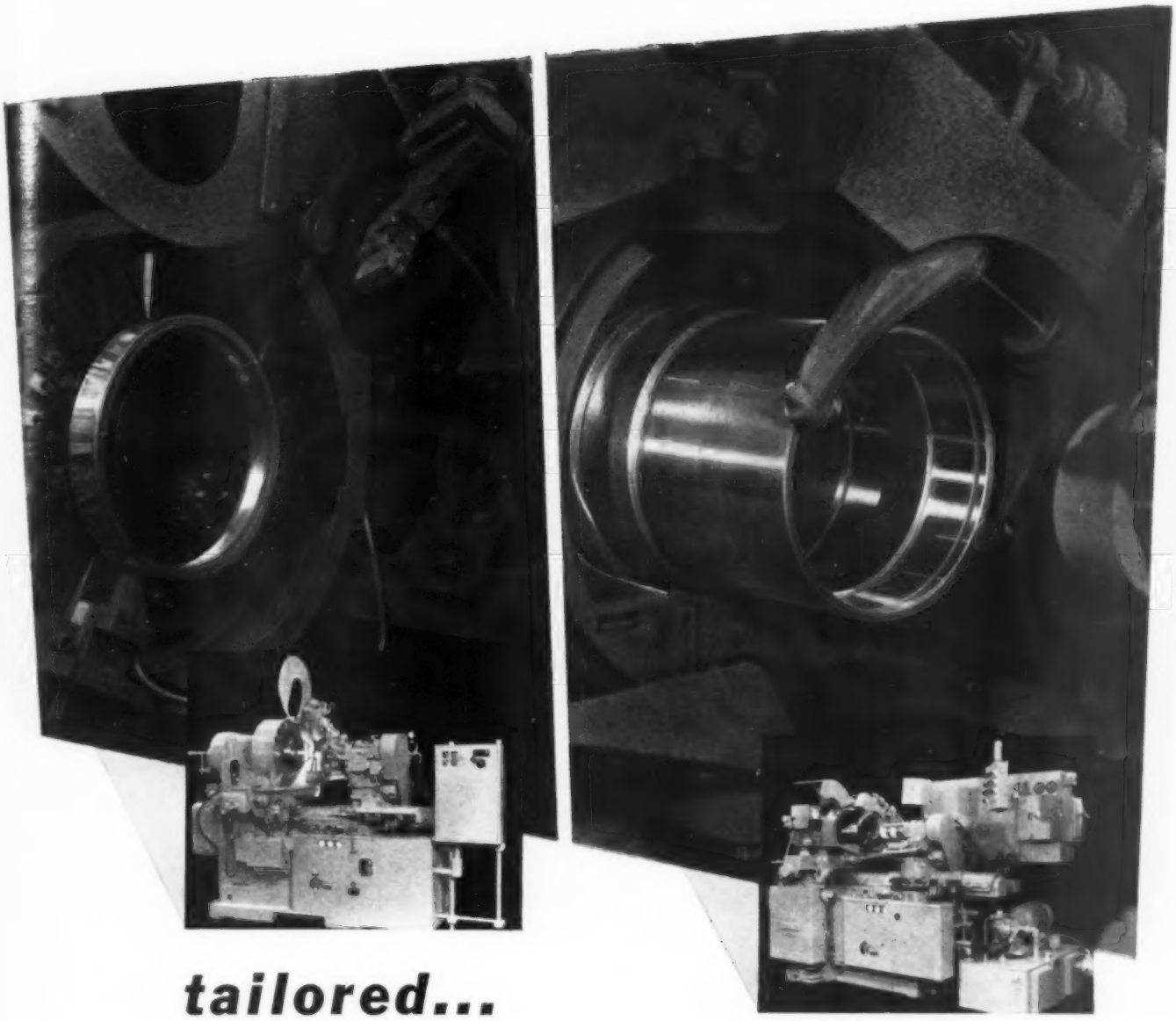
"The entire Japanese industry is badly in need of modern machine tools and qualified engineers who know how to set them up and instruct operators how to run them," Kleinoder pointed out. "Today, most Japanese manufacturers are working with out-dated equipment—20 to 30 years old. But there seems to be a rapidly growing awareness that manufacturing methods must be improved, productivity increased, and much of the old equipment must be replaced."

Trade Barriers Dropping

With the liberalization of trade barriers providing greater opportunities for vastly increased imports to the Far East, Kleinoder said that Japanese businessmen constantly raise the question of how they can buy American equipment on long term—seven years—low cost credit.

Unfortunately, however, the American machine tool industry has created the impression in Japan that it is not interested in the Japanese market, Kleinoder declared. This misconception can be erased, he said, by a greater exchange of views and visits between American and Japanese businessmen, and a strong effort on the part of the American businessman particularly to study and learn more about the Japanese way of doing business.

Americans must take this initiative, he feels, because Japanese businessmen have many wrong impressions



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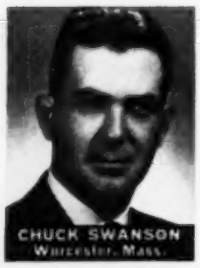
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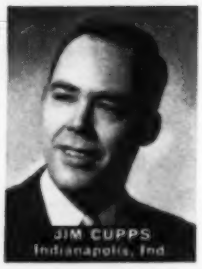
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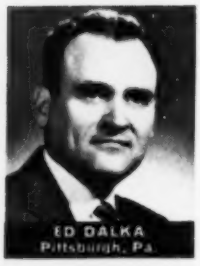
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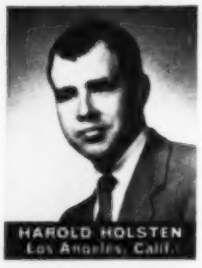
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These informative booklets on Elgin Diamond Wheels and Elgin Diamond Compound are available on request. Send for yours today!

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LETTERS (continued)

about the American economy. They believe, for instance, that American industry is composed only of "big business" with unlimited funds, able to do anything it wishes without exercising any responsibilities toward its employees or stockholders. Some of the fear and distrust has been aggravated by what Kleinoder termed the "fast buck" operators. All these fears and misconceptions can be overcome by an American manufacturer who will take the time to learn about the needs of his Japanese customers, make sound recommendations, and then proceed to deliver and install the equipment to the customer's satisfaction.

Jap Capacity No Threat

In urging a greater exchange of trade between the two countries, Kleinoder gave assurances that the industrial capacity of Japan is not now nor likely to become a threat to American industry or labor, any more than American industry expects to become a threat to Japanese industry or labor. On the contrary, Japanese businessmen generally are not convinced that they should raise productivity in order to make products available to their own domestic market at the lowest possible prices. This is the primary reason why they do not take advantage of the advanced American technology and high precision, high speed equipment which could produce close tolerance components for the Japanese in large quantities in the shortest possible time.

Nevertheless, the Japanese industry is capable of producing metalworking machinery as well as a complete line of consumer items including appliances and automobiles to reasonably high quality standards in substantial quantities. This is being accomplished with outdated equipment as well as old-fashioned methods. Productivity per man hour is low because of limited training—even of skilled workers.

Tremendous Potential

Kleinoder referred to the tremendous potential market of 95 million people in Japan who need and want everything they can produce. All the American equipment manufacturers have to do to tap this market, he concluded, is to do a "better selling job and give better service."

The Trade Mission Program of the Department of Commerce spearheads the Department's international trade promotion activities. Missions are composed of businessmen and representatives of the Government, with the goal of increasing commerce between the U.S. and all countries through numerous face-to-face meetings with business and civic leaders. Since 1954, some 80 Missions have traveled extensively in 47 countries. • • •

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There are two principal types of Behr-Manning resin-bonded abrasive belts:

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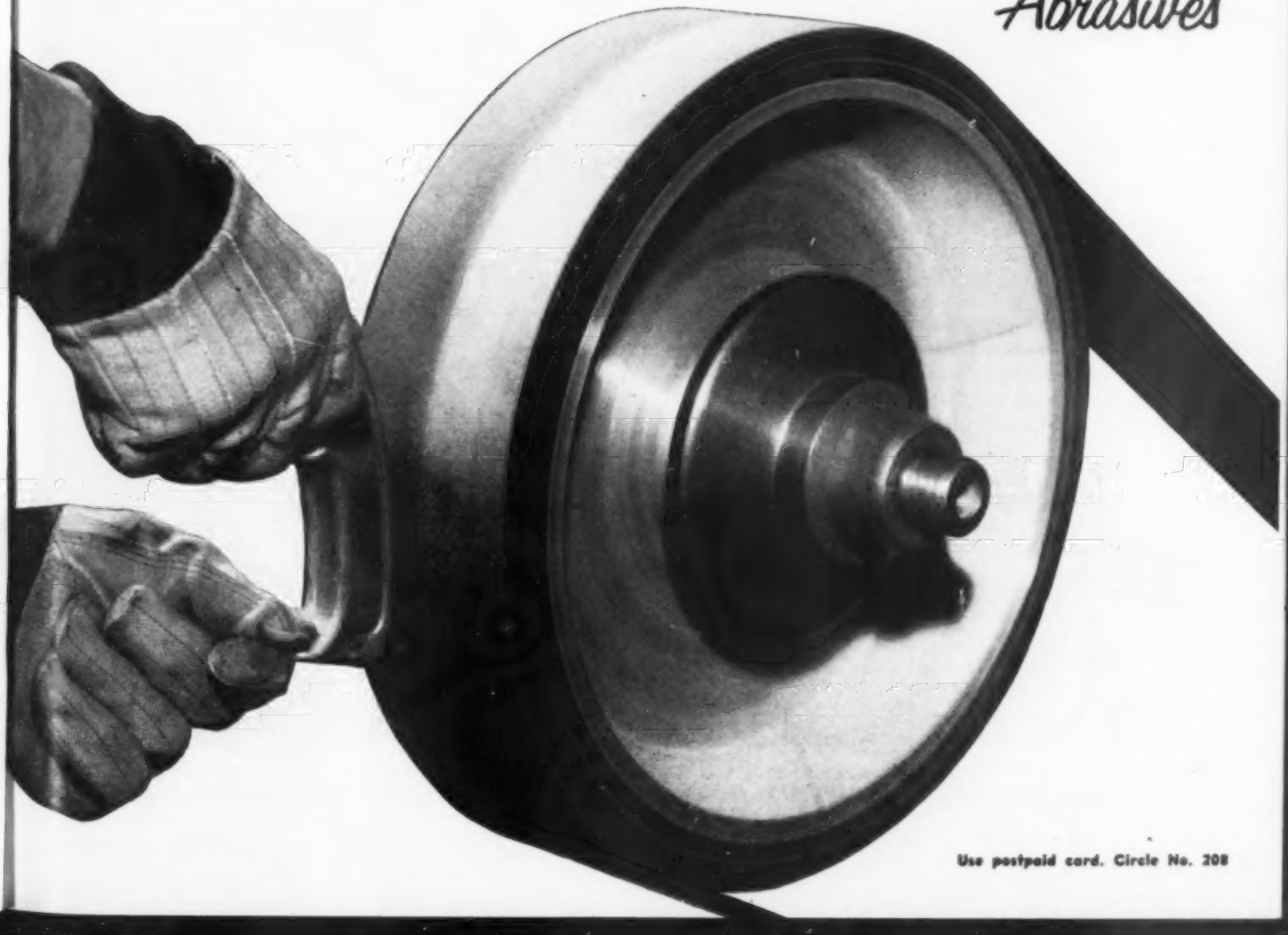

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SIMONDS SNAGGING WHEEL

Better grinding evident in fast stock removal with less wheel wear! That's why Simonds Snagging Wheels get the nod of approval in leading foundries, steel mills and metal-working plants. Resinoid bonded wheels contain a special additive that provides an internal lubricant for better grinding action . . . and are identified by new short markings, A166-R, C16-S, etc. Vitrified bonded wheels for gray iron contain V9 Bond, a chemically designed glass bond for greater uniformity and consistently superior performance.

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WHEREVER ABRASIVE OPERATIONS ARE PERFORMED

Editor's Page

OCTOBER, 1960

What Can You Do for Standardization

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You must support standardization if you expect to benefit from it. This rather obvious statement must be practiced as well as preached. If we want greater productivity at less cost it is quite apparent that standardization is one way to do it.

Now just how can you support the cause? To start with only you can insist upon standards. Every cause has a motivating force behind it and and in our case we must be this force. Talk it, request it, demand it—these are our weapons.

Next, we can become part of the development of these standards. Let's not wait for the other guy to do it. Don't wait for standardization to come your way. Every committee which is formed for the development of standards needs and wants the active co-operation of users, as well as manufacturers. Along with any insistence on standards should be an offer of active participation in the development.

Still another phase of support is the concentrated effort to use standards. Standards are of little value if they are not used or if too many exceptions are made. It should be the desire of everyone of us to fit the standards to every remote situation. Just one exception to the standards often leads to many more and eventual decay of the standards. A concentrated effort to apply standards even at some additional cost can be profitable.

The most recent standardization in our industry is reported in this issue. The Coated Abrasive Manufacturers' Institute has announced their proposed standards for coated abrasive belt lengths. Standardization of these lengths has resulted in reducing the the number of belt lengths from 104 to 31. These lengths which fall between 12" and 168" will fit over half of the machines now in operation. The remaining machines can probably be converted to take the standard sizes at very little cost.

CAMI has therefore done a lot of the work which is required in the development of these standards. It is now up to us to follow through with the support of these standards so that the value may be realized. Every effort should be made to use standard belt lengths without exceptions.

M. M. Patterson

Managing Editor

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Superfinishing is a quick, simple and inexpensive process. Oil seal surfaces are but one of the many applications where it can save you money. Not only can it eliminate trouble, but often it can help you reduce manufacturing costs. Gisholt engineers can advise you regarding its applications.

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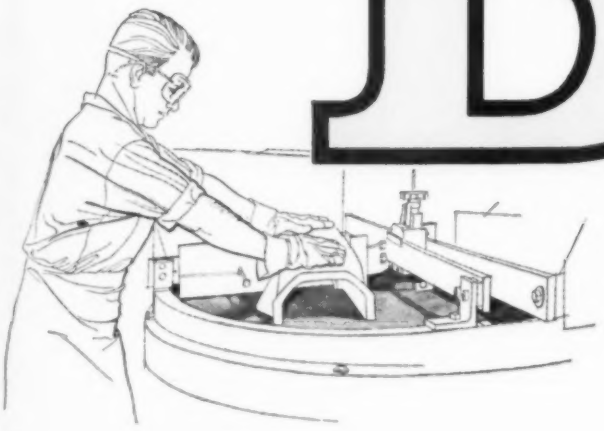

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Under development and testing for years . . . now available as the finest wheels of their type ever made.

The latest news-making achievement in Norton product development is the B14 resinoid bond for disc wheels.

It took several years to perfect this bond. It also took many months to complete nation-wide testing of the new B14 Discs, on all types of disc grinders — on jobs ranging from snagging to precision finishing, and on ferrous, non-ferrous and non-metallic materials. The tests were entirely comparative.

Results of this across-the-board testing are outstanding. The new B14 Discs have proved beyond question their ability to grind more workpieces per Disc . . . faster and better, with fewer dressings . . . and with constant uniformity throughout extra long Disc life.

Have your Norton Man, a trained Abrasive Engineer, study your requirements and make trial runs of the B14's you need — solid Discs or segmental, ALUNDUM* or CRYSTOLON* abrasive. Or get details from your Norton Distributor or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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JOB: Rough grinding iron castings, 3½" x 2½".

REPORT: **B14-37 CRYSTOLON wheel ground 6,000 parts with one dressing. Best previous Disc gave 4,500 parts with 4 dressings.**

JOB: Surfacing cold rolled steel washers on double disc machine.

REPORT: **B14-19 ALUNDUM Discs impressive as best so far, with very even wear.**

JOB: Double-disc grinding Alnico magnets.

REPORT: **B14 — mixed-abrasive wheel thoroughly approved for new orders.**

JOB: Rough grinding miscellaneous parts on double end machine.

REPORT: **B14-44 ALUNDUM Discs performed better, lasted longer than all other types.**

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This new Blanchard Grinder of advanced design offers you many important features, all adding up to better, faster surface grinding. The No. 18-A2 Blanchard is a versatile, rugged, hard-working machine. It is of a "dry base" design: in operation, all coolant and chips flow to an outside settling tank, separator, or central coolant system. Easy access is provided to the grinding wheel area, and push-button stations and operator's control are conveniently located for ease of set-up. All controls are interlocked, guaranteeing complete safety. Whenever grinding wheels require replacement, a warning light flashes at the operator's station. The No. 18-A2 Blanchard may be equipped with 30, 40 or 50 HP, foot-type spindle motors. This grinder can also be provided with 40" magnetic chuck or 43" plain table for special work holding fixtures.

THE BLANCHARD MACHINE COMPANY
64 State Street, Cambridge 39, Mass., U. S. A.

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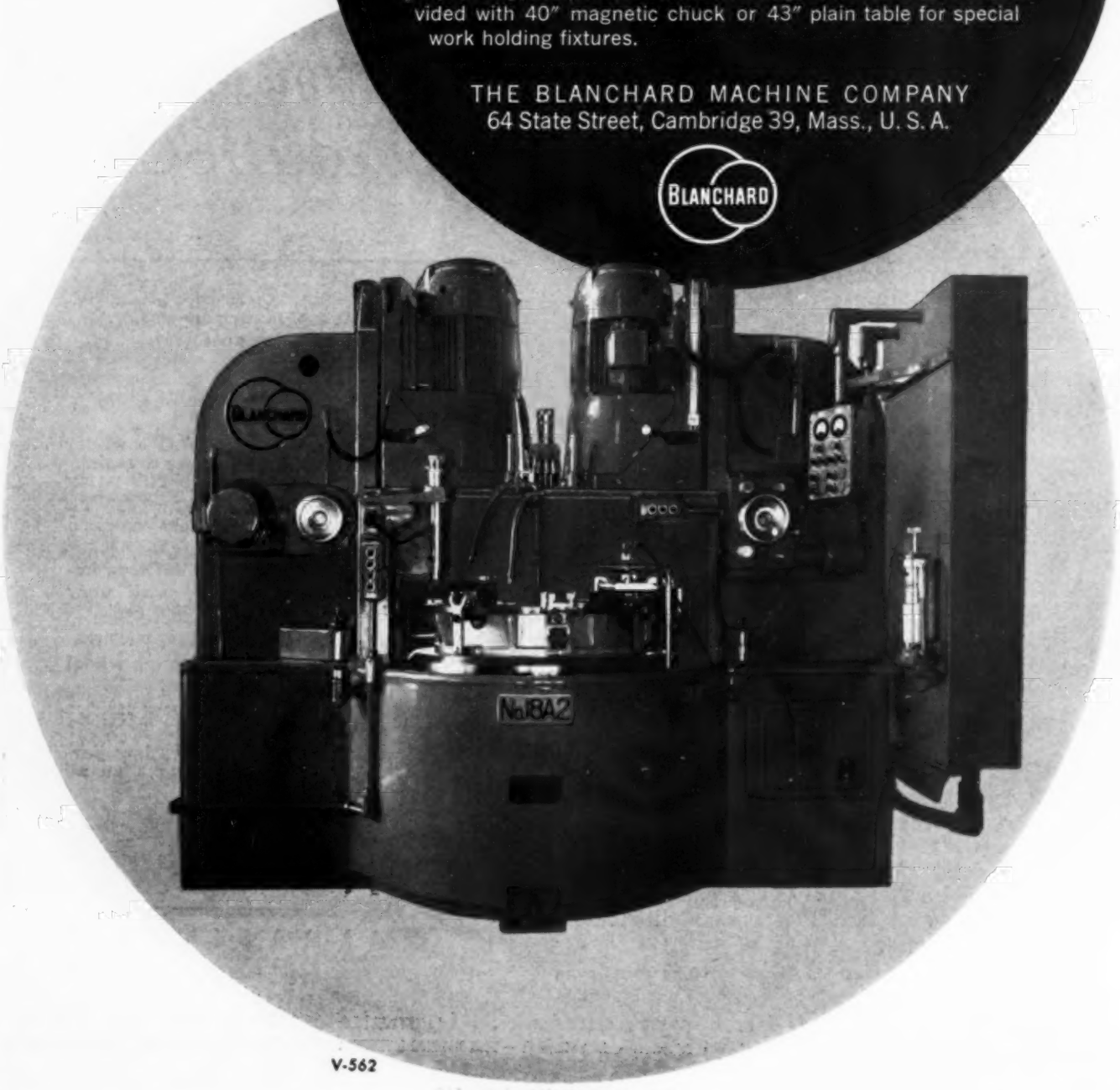

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American Society for Abrasives

Come On In . . .
The Chapter's Fine . . .

The activities and objectives of the American Society for Abrasives and its chapters have been discussed on this page since the Society was founded.

Membership in the Society can be valuable to any man interested in abrasives (i.e. our readers).

Hundreds of worthwhile speeches, scores of rounds of golf, perhaps a dozen plant tours, picnics, and at least one three-night seminar on abrasives are some of the activities that have built the Society to a membership in the neighborhood of a thousand men.

If you're interested in knowing more about abrasives, a letter or phone call to the nearest chapter representative listed below (or to National headquarters for non-affiliated membership if you're out of the range of a chapter) will get you started. Come on in . . .

Connecticut Chapter No. 1
Egbert Broekuysen
Micromatic Hone Corp.
Boston Post Road, Guilford, Conn.

Boston Chapter No. 2
E. Vallee
30 Park Street
Lynn, Massachusetts

Reading Chapter No. 3
Leon W. Stout
Textile Machine Works
P.O. Box 1382, Reading, Pa.

Pittsburgh Chapter No. 4
Frank Cramer, Jr.
429 Edgewood Rd.
Pittsburgh 21, Pa.

Western Michigan Chapter No. 5
Gerald E. Berry
2390 Greenwood St.
Muskegon, Michigan

Detroit Chapter No. 6
Fred A. Teska
Macklin Co.
1144 W. Baltimore, Detroit, Mich.

New Jersey Chapter No. 7
William J. Yurecko
48 Underwood St., Newark, N.J.

Long Island Chapter No. 8
Herman Golden
71 Lion Lane, Westbury, L.I., N.Y.

Detroit Chapter members at their June meeting demonstrate proficiency in the preliminaries. Good fellowship is a hallmark of ASA.

Hudson-Mohawk Chapter No. 9
Robert H. Wilcox
6 Robinson St., Saugerties, N.Y.

Western Massachusetts Chapter No. 10
Otto K. Ebelt
Cortland Grinding Wheel Co.
Chester, Mass.

Saginaw Valley Chapter No. 11
A. Ross Boergert
320 N. Carolina St.
Saginaw SW., Mich.

Delaware Valley Chapter No. 12
Cornelius J. Hause
17 Meetinghouse Rd., Hatboro, Pa.

Chicago Chapter No. 13
Henry A. Hoppe
1523 Hollywood Ave.
Chicago 26, Ill.

Cleveland Chapter No. 14
Paul R. Wilson
3627 W. 47th St., Cleveland 2, Ohio

National Headquarters
American Society for Abrasives
120 North Fifth Street
Reading, Pennsylvania

Western Massachusetts to Hold Meeting in Greenfield

An innovation for the Western Massachusetts chapter will be a meeting in Greenfield on Monday, October 17. This is the first out of the Springfield area.

Albin Overgaard, of Greenfield Tap and Die, will be chairman.

The first meeting of the fall season was built around the theme, "New Fields of Grinding," with **Everett Sinclair,** manager of product engineering for Norton Company, Worcester, Massachusetts, as key speaker.

Behr-Manning Engineer Talks Coated Abrasives at L. I.

Thomas S. Wilson, product engineer and technical consultant on coated abrasives for the Behr-Manning Company, Troy, New York, discussed new techniques and applications in the field at the September 14 meeting of the Long Island chapter, held at Wheatley Hills Tavern, 170 Post Avenue, Westbury, New York.

• New Grinding Features . . .
• New Grinding Efficiency

The J&L Model E-2 Automatic Form Grinder

with PERPETUAL FORM CONTROL through a full 12" width!

J & L's new Model E-2 Automatic Form Grinder offers a combination of features that add up to unprecedented production efficiency.

Wide range of work speeds, from 50 to 1500 R. P. M. New unitized headstock has a constant-speed AC motor, with fast cycling achieved by means of an electric clutch and brake. Proper surface speeds available for all diameters up to 8".

Completely automatic cycle, with automatic positive size control. High-speed approach, variable feed, spark-out and withdrawal are positively controlled through simple cam action. Wheel slide is held against a positive stop with uniform hydraulic pressure.

All kinds of wheel trueing, including PFC through 12" width. All types of J & L diamond dressers are available. Also, crush dressing for wheels up to 4" in width. In cemented diamond particle cutters for continuous wheel forming, there are sensational new capacities up to 12" wide.

Capacities up to 31", for precision shaft work. Swivel-type platen up to 15°. Up to 31" between centers. Equally suitable for chuck work.

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POSITIVE DUPLICATION – EVERY TIME!

These highly accurate apothecary weights give *exact* results, time after time after time. You will get this same kind of Positive Duplication with these center-type grinding wheels, and with *all* CINCINNATI (PD)° GRINDING WHEELS.

HOW POSITIVE DUPLICATION IS ACHIEVED

The predictable performance of these wheels is the positive result of Cincinnati's unique (PD) manufacturing process. It involves 36 separate quality controls which produce grinding wheels of unsurpassed uniformity. For example, sensitive print-weigh scales put an unmistakable record on each mix card of the exact amounts of materials used. And the figures *must* correspond to the exact amounts called for.

UNIFORMITY HELPS YOU

When you use CINCINNATI (PD) WHEELS you can plan production schedules with the assurance that each reorder wheel will act and grind exactly like the original. This is the promise—and *performance*—of Positive Duplication.

CALL CINCINNATI TODAY

Solve your grinding problems with the help of Cincinnati's factory-trained specialists. Their wide experience in job set-ups and grinding operations is at your service. Just call your CINCINNATI (PD) GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

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CINCINNATI°
GRINDING WHEELS

°Trade Mark Reg. U. S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

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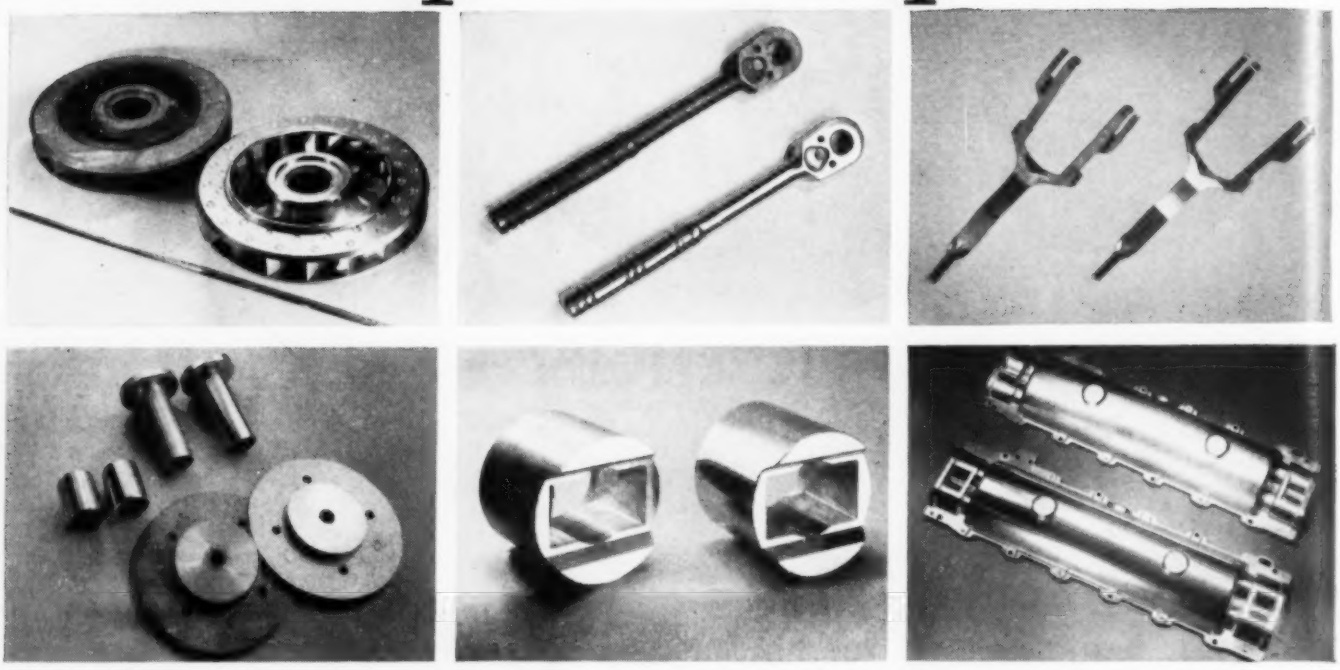
vibration



These photos prove it! Pangborn Vibratory Finishing gives the kind of finishing you never had before!

Pangborn Vibratory Finishing—culmination of years of experimentation and refinements*—is the newest method for cleaning, descaling, deburring, grinding, radiusing, fine-finishing, coloring and burnishing all metal and metal alloy parts, suitable plastic and ceramic items.

This unit gives you versatility of application, larger payloads and greatly-reduced time cycles resulting in tremendous savings. It easily handles parts too delicate or intricate to finish by other methods . . . shielded areas and interior surfaces . . . even coarser jobs faster and better.

In a wide range of sizes. Also auxiliary equipment, media and compounds for every need. Send parts with exact finish specifications, or finished specimen, for sample processing in our laboratory to: Mr. William E. Brandt, PANGBORN CORPORATION, 820 Pangborn Blvd., Hagerstown, Maryland.

- Actually works up to 100 times faster than conventional methods; does more work better at lower cost
- Does work impossible to do by barrel finishing or other means
- Most compact vibrator on the market
- Air cushion support and suspension for automatic leveling and amplitude control supplants spring suspension systems subject to fatigue
- Standard basic machines are equipped with mechanically variable speeds
- Floor vibration entirely eliminated, making possible (for the first time) second floor mounting

* Pat. No. 2,422,786; June 24, 1947

Pangborn
OF HAGERSTOWN

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Abrasive Engineer's Corner

ARTHUR RAKESTRAW • Contributing Editor

Feeds and Speeds for General Purpose Grinding Wheels

• What are recommended feeds and speeds, using a so-called general purpose wheel on miscellaneous materials? —W. E., Jr., Lynn, Mass.

This question, like a satellite in orbit, makes its appearance at more or less regular intervals, possibly because it can never be satisfactorily answered.

Although you did not mention the specific grinding classification involved, I have assumed that it is center type, or cylindrical.

Any answer to a question of this kind can very quickly become complex. For instance, the term "general purpose" wheel can cover a considerable range of grades, grain sizes, and types, depending on the particular user.

The wheel specification varies greatly with the diameter of the abrasive wheel and the diameter of the workpiece.

The amount of material removed per work revolution depends to a great extent on the spindle horsepower. To complicate matters, the finish required may vary greatly.

Research by the many manufacturers of grinding machines has not been carried on extensively because of the multitude of grinding requirements.

"For Pete's sake, man, watch it with that coolant!"

Most of the grinding machines built today are designed for a particular job under specified conditions.

There was a time when grinding machines were built with variable spindle speeds as well as variable work drive speeds, to allow the machine to take care of almost any grinding requirements that would be presented. Specialization has eliminated most of these variables.

If all of the available grinding information could be collected, correlated and indexed, what a fund of information would be available for industry. One of the objectives of GRINDING and FINISHING is to make more and more of such information available to our readers.

In short, grinding is still pretty much of a custom operation.

Choice of Portable Grinders

• What are some of the considerations which are basic in determining whether to use air or electric portable grinders? —J. A., Brillion, Wisconsin.

As has been said many times, the more specific and complete the question, the better the answer. Had this question been accompanied by a more detailed statement regarding the type of work to be handled and possibly the available equipment (if any) it would have been possible to provide a much better answer.

As it is stated, it is not clear whether this is a question of deciding between the two types now in use, for instance, in a foundry room, or whether it is a matter of deciding on equipment for an application where no equipment is now in use.

Without some knowledge of the application in question, it would be necessary to cover the whole field of portable grinding to make sure that your question had been answered.

Certainly three of the fundamental considerations are these: the type of work to be done; the equipment available, if any; and the availability of power.

If it is assumed that the application is related to the grinding of castings in a foundry cleaning room, compressed air is usually available for other purposes, and the extension of air lines to a location where portable grinders are to be used is not a major problem.

Trapping out condensation and keeping the air lines open in winter in unheated rooms are matters to be concerned about, but these can usually be resolved without difficulty.

Many operators prefer air grinders because they are lighter in weight and consequently less fatiguing.

Air hoses can be cut by shifting castings without causing major damage. Cutting an electric cable in similar fashion brings the possibility of shock.

Certainly the comparative hazards of the two methods are a factor to be considered.

On the other hand, there are many installations of portable electric equipment that are entirely satisfactory.

Electrical outlets are more numerous than air outlets, and thus permit the use of grinders in out-of-the-way locations without special installations.

Speeds of electric grinders are likely to be more uniform than those of air grinders. Maintaining adequate air pressure at the tool is likely to be a problem.

Comparative maintenance cost of the two systems is yet another consideration. There may be working conditions of dust or excessive moisture, for instance, which would tip the balance in favor of one or the other.

In a plant where compressed air is not readily available, the electric portable would appear to be the better choice. In most foundries, it is definitely an open question. • • •

THE CORNER is a good place for your problems, comments, and experiences in abrasives and their uses. Send your questions or contributions to: A. S. Rakestraw, GRINDING and FINISHING, Wheaton, Ill.

Here's what Link-Belt reports about the results they obtained from the use of U.S. 30" Wheels when grinding white iron castings in their Indianapolis plant.

- Wheels used under extreme pressure did not groove when removing small, narrow gates.
- Wheels were fast-cutting, yet did not burn or check the casting.
- Wheels were self-cleaning, so constant dressing was eliminated.
- Wheels proved so economical and practical for high-speed grinding that they justified investment in this type of equipment.
- Grinding wheels removed gates in one pass against the wheel.
- Workers were pleased with the wheel's efficiency and operation.

U. S. Rubber is a specialist in producing resin-bonded or rubber-bonded wheels to reduce grinding wheel costs to the minimum. Our factory-trained salesmen study your problems and bring them to the plant for solution. Look to them to take care of your present and long-range grinding wheel problems.

US RUBBER

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

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A REPORT

on the superior tailor-made qualities of

G-E MAN-MADE DIAMONDS for METAL BOND WHEELS

A COMPARISON

In the electrolytic grinding of more than 311,000 miscellaneous carbide tools, six metal-bond wheels containing General Electric's latest type MBG Man-Made Diamonds were given a direct comparison to six wheels containing natural diamonds. The result shows a 22.5% superiority of G-E Man-Made Diamonds over natural diamonds.

Diamond Type	No. of Wheels	No. of Tools Ground	Avg. Wheel Wear Inches	Avg. Cu. In. Carbide Removed	Avg. Cu. In. Carbide Removed Per Cu. In. Wheel Wear	Efficiency Ratio
G-E MBG	6	160,713	.0605	90.885	70.2	122.5
Natural	6	150,496	.0644	80.181	57.3	100.0

A CONCLUSION

This comparison between G-E type MBG Man-Made Diamonds and natural diamonds is but one example of the superiority of this crystal developed specifically for metal-bond grinding wheels. The announcement of this new, blocky, tougher crystal, in 80-mesh and finer, with rough surface characteristics, was made by G.E. in April of 1960. In this short time reports reveal that MBG diamonds have shown outstanding results, not only in electrolytic grinding, but in the grinding of sapphire, slicing and dicing of germanium, cutting coarse-grained alumina and carbides.

Your own tests will demonstrate the worthwhile advantages of these new industrial diamonds in your metal-bond grinding operation. Call your grinding wheel supplier today. Metallurgical Products Department of General Electric Company, 11177 East 8 Mile Ave., Detroit 32, Michigan.

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

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BELLOWS-AIRBORNE

Electronic

INFEED GRINDER CONTROL SYSTEM

HOLDS WORK TO .0002" IN PRODUCTION QUANTITIES

(To .000070" On Parts Smaller Than ½")

Electronic unit continuously monitors position of slide relative to workpiece in order to obtain predetermined finished size . . . Variations in size of workpieces do not affect finished size . . . Compensation for wheel wear and variations in machine elements and operating conditions can be made without shutting down the machine . . . A single control knob permits adjustment for size while grinding is in process.

INCREASES OUTPUT OF EACH WORKER AND MACHINE

Pre-grinding operations are eliminated . . . Speed and ease of set-up reduces downtime.

CUTS DIRECT AND INDIRECT GRINDING COSTS

Higher production per machine and per worker and elimination of "rough grinding" time means that fewer grinders and fewer workers are required to maintain existing production requirements.

635C-3

The Bellows-Airborne Infeed Grinder Control System consists of a modified MICROtrol Control Unit, manufactured by the Airborne Instruments Laboratory division of Cutler-Hammer, Inc., linked to a special Bellows Grinder Feed. Designed primarily for use with a Cincinnati #2 Centerless Grinder in applications where the part is not ground over its entire length (such as headed pins, rounds or pins of divided diameters, or parts which cannot traverse between the wheels), the unit offers both coarse and fine feeds and can be set for either continuous cycling or single cycle operation.

For complete information, without obligation, write Dept. GF-1060, Bellows-Valvair, Akron 9, Ohio

Bellows-Valvair

AKRON 9, OHIO

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

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Single copies: Circle No. 100, Reader Service Card. Quantity prices: Page 47, No. 100

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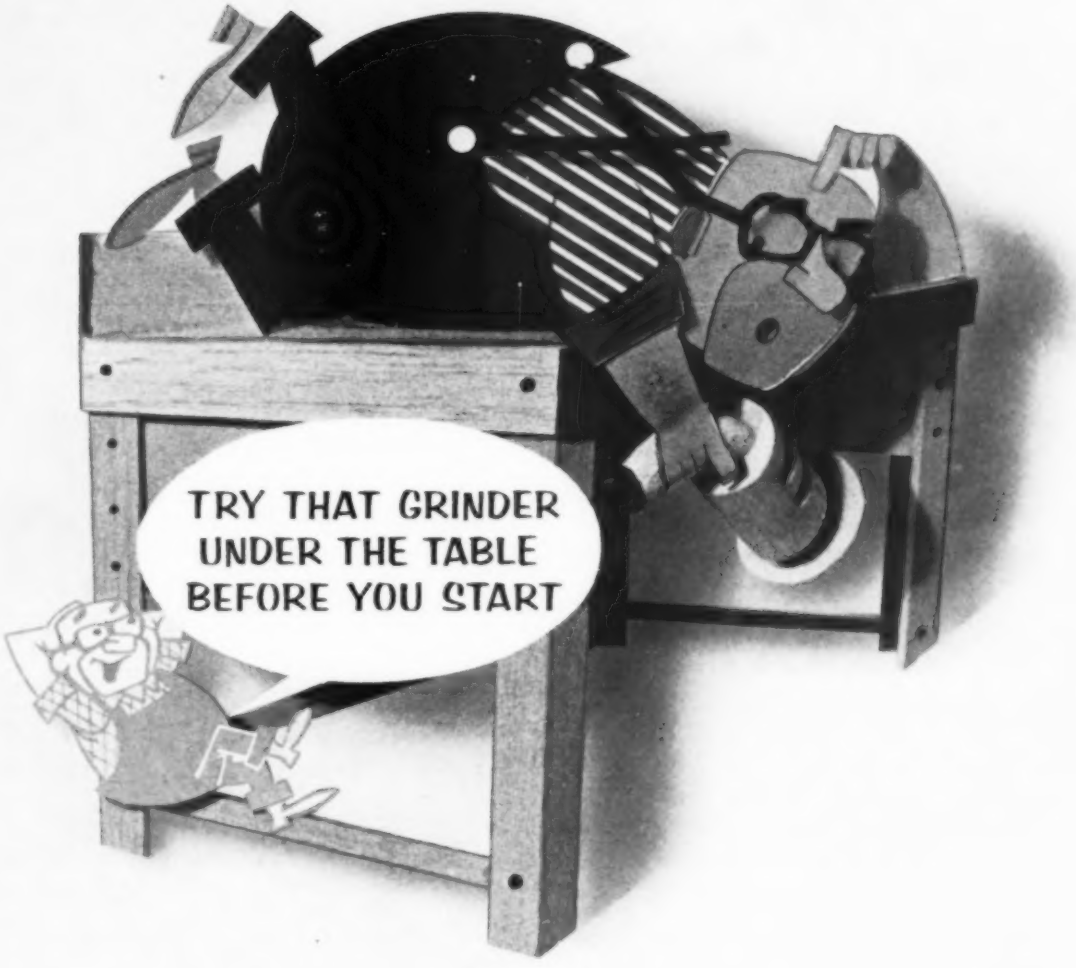
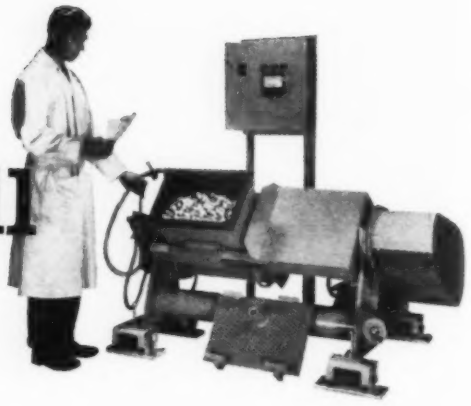
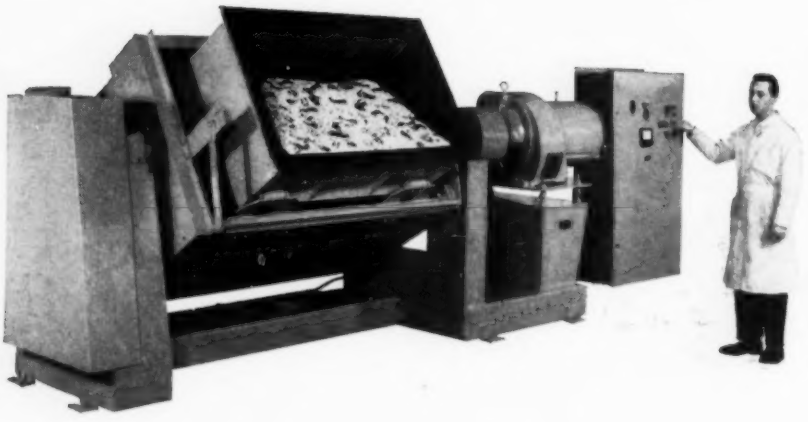


Large LORCO small Company...





LORCO®
VIBRATORY FINISHING
can be profitable in your business

You don't have to be big to profit from Lorco vibratory finishing. With five years of intense concentration on finishing problems of all kinds, Lorco has developed a complete line of vibratory equipment, engineered and priced to suit every production requirement.

All five Lorco models offer the same advantages of versatility, speed and production economy, regardless of the shape, size, composition or complexity of your work. Delicate parts are finished without distortion. Coarse work requiring heavy stock removal can be quickly deburred or cut down. Shielded and recessed areas are thoroughly finished to the most precise dimensional tolerances.

Whether you need a machine with 1 or 16 cubic feet of load capacity, to finish large pieces in large volumes, or small, delicate parts and lower production requirements, Lorco has the right equipment at the right price. The facts and figures of Lorco vibratory finishing are all in this new, illustrated catalog. Ask for Bulletin 600.

YEARS-AHEAD DESIGN
means outstanding performance

Only LORCO . . . originator of Vibratory Finishing . . . can offer you the world of experience and outstanding machine performance that come from 5 years' leadership in making over 100 successful installations. Write for the valuable help a seasoned Lorco engineer can give you.

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a majority-owned subsidiary of
WHEELABRATOR CORPORATION

2068-C SOUTH QUEEN STREET • YORK, PENNSYLVANIA

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A Sunnen Honing Machine will handle any hole-sizing job shown here. It's the most versatile machine for all types of I. D. work . . . now used in thousands of shops.

It corrects all previous machining errors with minimum stock removal . . . and guarantees tolerances to .0001" with any desired surface finish.

You pay no premium for the extra precision . . . because Sunnen Honing is a fast, economical abrasive stock removal process.

It handles tandem bores, thin wall parts, blind holes, bores with ports or lands—in any size or shape part. No fixtures, no chucking or set up time.

I. D. range: .100"—2.625" with standard tooling. Built to order thru 4½".

SOLVE ALL OF THEM WITH . . .

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ASK FOR FREE BOOKLET

X-SP-5075 . . . showing 99 honing case histories covering all types of bore-sizing problems.

TODAY'S TOLERANCES AND FINISHES CALL FOR HONING

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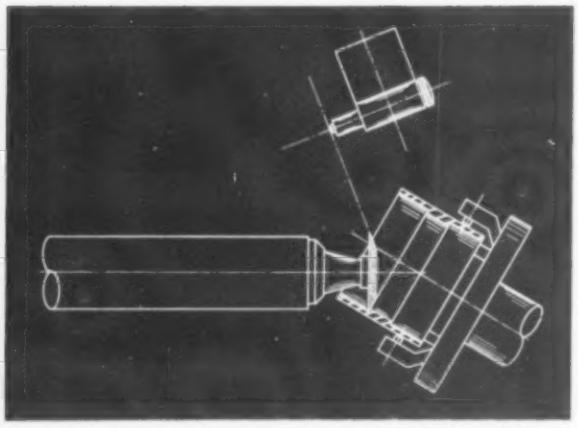
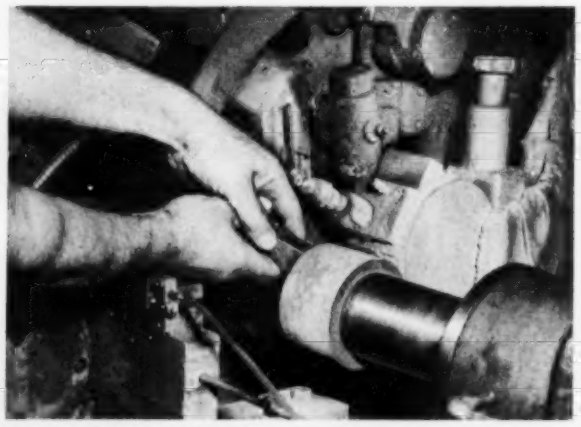
SKF Doubles Production and Cuts Costs

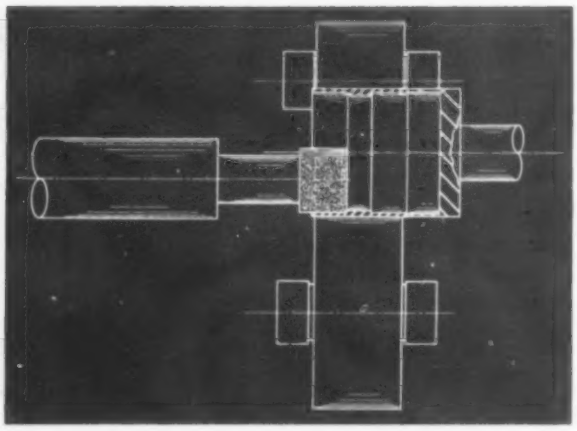
A team of grinding specialists at SKF solved a problem of production, quality control and costs through changes in wheel design and specifications. The solution decreased losses, increased production 127% and increased stock removal rate 310%.

By HARRY N. WERNER
General Foreman, Spherical Unit



SKF operator dresses aluminum oxide wheel previously used to grind center flange of outer race of multi-row bearing. This old method required diamond dressing twice for each bearing.





New method of dressing cup wheel of softer grade and coarser grit size with sulfur treatment. Dressing was reduced to once every ten bearings.

TOLERANCES

PARALLEL	.020 M/M	.014 TO .017 M/M	.005 TO .007 M/M
SIZE	.002"	WITHIN .002"	WITHIN .002"
ANGLE	.0012" TO .0018"	.0013" TO .0015"	.0013" TO .0015"

● SKF Industries, Inc. of Philadelphia, was faced with the problem of holding a 30 minute angle of ± .0003" with a finish of less than 25 rms and parallelity of less than .0006" on the center flange face of a multi-row bearing's outer race while maintaining .002" for size. The problem was greatly increased when Production Planning called for thousands more of this type of bearing which was being turned out at the rate of a little better than 4.5 per hour. The topper was that quality rejections were forecast as a man-sized headache. To complete the picture, it was known that loading the wheel at the periphery could result in grinding cracks on the part.

SKF's team of grinding specialists decided to take two steps to effectively solve this problem. The first step was to change the wheel design. The old design was a 5 x ½ x 1 wheel dressed to a sharp point at the periphery from a 2¾" diameter. The new wheel is a cup wheel with 4" x 3" x 2" dimensions. The ½" rim of the wheel is dressed to 1/16". This step resulted in decreased dressings from two per bearing by the old method to one dressing per ten bearings with the new design.

The second step was to change the wheel specifications to a softer grade, coarser grit size and add sulfur treatment.

The results of taking these two steps were a production increase of 127%; grind and drift time reduction from 8½ minutes to 2 minutes; wheel wear cut in half; wheel life increased from 25 bearings to 100 per wheel and stock removal rate jumped to 310%.

Most important to these grinding specialists at SKF, they enabled their company to increase the production to meet the customer's demanding requirements while holding down the quality rejections which were previously forecast. • • •

	OLD METHOD	NEW METHOD
WHEEL DIMENSIONS	$5 \times \frac{1}{2} \times 1$ FROM A $2\frac{3}{4}$ FLAT SPOT TO A SHARP POINT AT PERIPHERY	$4 \times 3 \times 2$ $\frac{1}{8}$" RIM $\frac{1}{8}$" BACK (USE $\frac{1}{16}$ OF RIM)
SPECIFICATIONS	38 A 100 M8 VBE (NORTON)	19A541BVG SULPHER TREATED (NORTON)
PRODUCTION PER HOUR	4.6	10.5 CONTEMPLATED MACH. FEED ONE MAN OPERATE TWO MACHINES
% INCREASE		127 %
GRIND TIME AND DRIFT (MINS.)	8.34 PER BEARING	2.02 PER BEARING
WHEEL WEAR	.004" PER BEARING	.008" PER BEARING
DRESS	2 PER BEARING	1 PER 10 BEARINGS
WHEEL LIFE	25 BEARINGS	100 BEARINGS
WHEEL COST	$ .08 PER BEARING	$ .03 PER BEARING
S.F.P.M. WHEEL	6500	5000
S.F.P.M. WORK	200	250
S.F.P.M. RATIO	32.5 : 1	21 : 1
TYPE OF GRINDING	LINE CONTACT	SIMILAR TO SURFACE GRINDING INCREASED ARC AND AREA OF CONTACT
WHEEL TRAVEL DISTANCE	$\frac{\text{STOCK}}{\text{WORK HEAD ANGLE SINE OF 20°}}$ $\frac{.015"}{.34202} = .044"$	STOCK PLUS WHEEL WEAR .015 + .008 = .023
STOCK REMOVAL INCHES PER MIN.	.0036" $\frac{.015"}{4.17}$	$\frac{.015"}{1.01}$ .0148"
INCREASE IN STOCK REMOVAL PER MIN.		310 %
DIAMOND COST	$ .07 PER HOUR	$ .000 PER HOUR (DRESSED WITH SILICON CARBIDE STICK)

Successful Metalworking Shows Present Higher Grinding Efficiency for Users

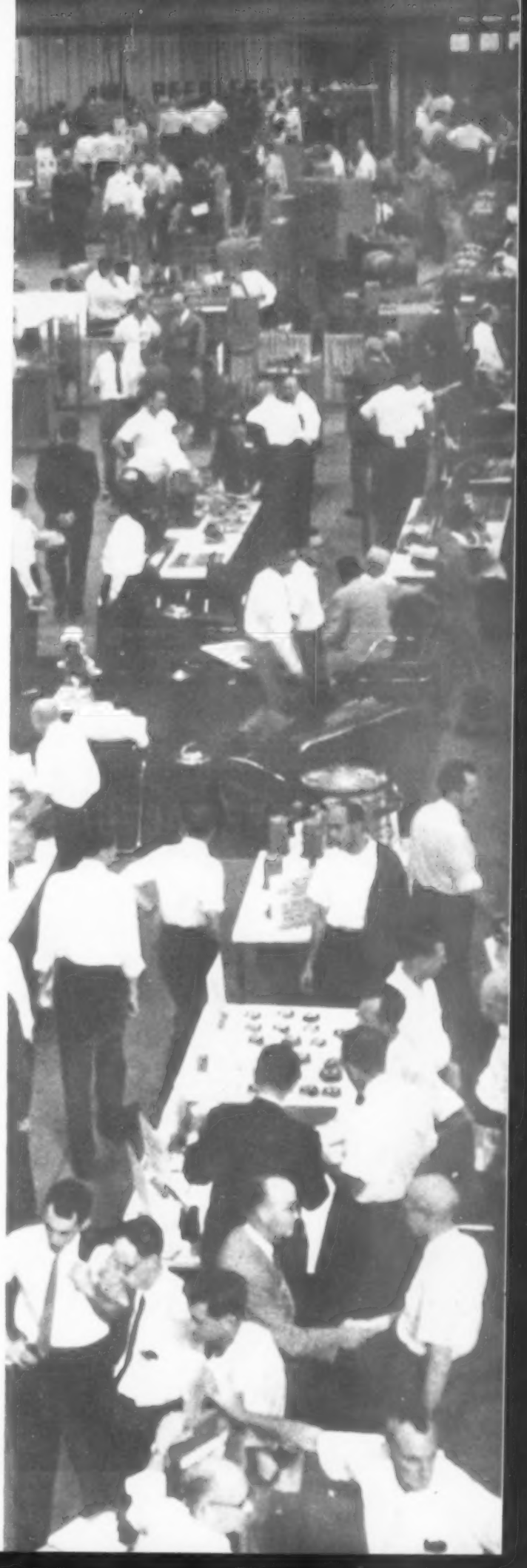
This review is intended to provide a brief summary of the shows and the reactions of the exhibitors. Due to space and deadline limitations outstanding machines and methods which deserve detailed coverage cannot be covered in this article. Watch future issues for complete reports on these machines and methods.

● The metalworking shows held in Chicago last month did exactly what they were intended to do. These shows proved to be an excellent and exciting presentation of new and improved machines and accessories for an extremely sophisticated audience. It might even be said that these shows exceeded expectations as more sales were completed and a greater number of good inquiries were received than in the 1955 shows. Registration at The Machine Tool Exposition totaled about 60,000 while attendance for the ten days amounted to 180,000, thus lending emphasis to the fine job done by the machine tool builders in that they presented exhibits interesting enough to hold each registrant for an average of three days.

This show was also high-lighted by the amount of interest in grinding and finishing equipment. Here again, every exhibitor we talked with remarked about the intelligent questions being asked and quality of the attendance at the shows. There has been a definite increase in the use and understanding of abrasive operations since the 1955 shows. This can be attributed to greater understanding of the advantages of abrasive operations through selling, advertising and the increased number of articles written on the subject.

It is impossible to pick out any one new machine or development which could be considered the highlight of the shows. But, there was a group

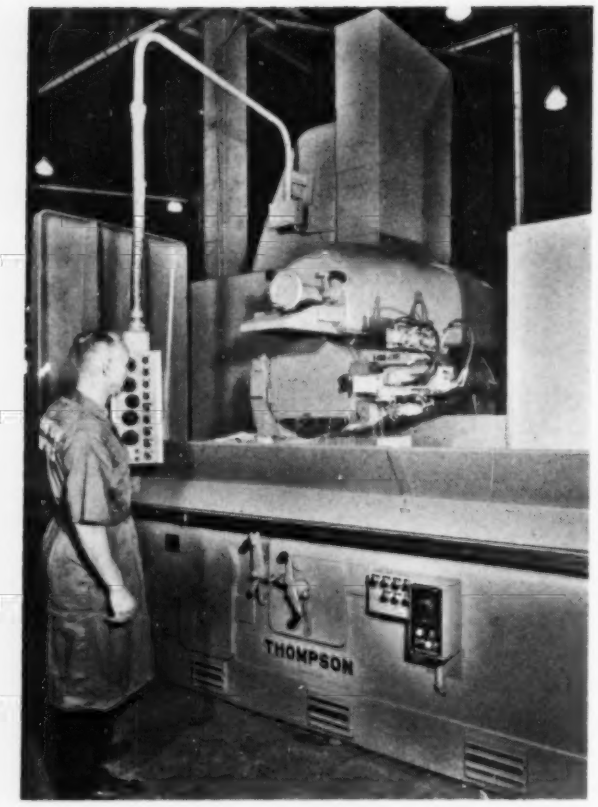
- Many more sales completed than in 1955 shows.
- More grinding equipment shown.
- Greater interest in grinding operations.
- More sophisticated attendance.
- More intelligent questions asked.
- Greater advancement in machines and methods displayed.



of exhibits which should be noted as providing more than the usual amount of interest.

Norton's booth attracted attention for four reasons. One was a new surface grinder with a table speed of 150 fpm. The importance of this increased table speed matches the second point at Norton which was the announcement of higher speed wheels. It should be noted that while higher speed wheels are advantageous for cylindrical grinding when properly applied, higher table speeds allow surface grinders to take advantage of wheel speeds now being used. Still other points of interest here were the automatic crankshaft grinding line and automatic wheel balancing.

Cincinnati Milling Machine Co. displayed a very educational series of movies in a unique coin machine arrangement. The movies covered very basic, graphically illustrated grinding theory and information. Also of note were gaging equipment and tape control grinding. High precision match



This completely electrically controlled high production Thompson Grinder removes up to 15 cubic inches of metal per minute and can finish to an accuracy of .0001".

grinding was performed in this booth through the use of the recently developed gaging and control equipment. Tape control, always an attention getter, enhances the precision cylindrical grinding operation by increasing the precision of repeatability.

Still another exhibit, Landis Tool Co., displayed a tape controlled cylindrical grinder and a similar machine with Microfeed and Size Finder attachments which will do almost as much as tape control with lower initial cost.

Still another tape controlled machine was on display at the Thompson Grinder Co. booth. This machine for grinding continuous-path contours in both the horizontal and vertical planes also featured a wheel head which could be rotated in the horizontal plane. Another outstanding machine in this booth was a surface grinder with Cybermatic Pendant Control which completely eliminates hand wheels with dial controls to extremely fine increments.

A form grinding and gaging display made Sheffield Corp.'s booth most interesting. Outstanding was the crush form grinding of two parts simultaneously, one above and one below the centerline of the wheel, removing .050" of stock in 1.75 seconds per part with wheel speeds of 10,000 sfpm. Also deserving mention was the larger crush forming of rod mill rolls (July, GRINDING and FINISHING).

For those interested in the case of grinding versus other metal removal and how grinding can

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... we do not simply select a "suitable" size and shape per given bond — we manufacture all three bonds in all sizes as evidenced by our catalog =160. Write for it today.

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hold down cost as a stock removal operation, the Mattison Machine Works booth displayed an excellent story on cards. Included were examples of the economic advantages of grinding over cutter-type machining along with a gigantic casting which had been ground from the rough.

• • •

One setup and the grinding of this complete shaft takes only 22 minutes. Numerically controlled, multiple, diameter, 18" x 72", Cincinnati Cylindrical Grinder is grinding five step diameters in succession.

Group above is being shown the three roll construction of the Mattison Abrasive Belt Grinding and Polishing Machine.

WE ARE MANUFACTURERS of RESINOID and RUBBER BONDED GRINDING and POLISHING WHEELS . . .

. . . we have pioneered

★ reinforced rubber grinding wheels for high speed operation

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Put a 30 lb. air hoist to work for you which lifts over sixty times its own weight. Easily handled by one man. Infinitely variable speed control from dead slow to 50 ft. per minute lift, 96 ft. per minute descent (1000 lb. model). Pendent or pull-cord control. Hook or trolley mounting. Roller or link chain. Automatic disc brake. 500, 1000, 2000 lb. capacities. Other models to 3 ton capacity. Your Thor factory representative or distributor will demonstrate in your own plant. Thor Power Tool Company, Aurora, Illinois. Branches in all principal cities.

Thor POWER TOOLS

Abrasive Belt Lengths Standardized

Exclusive to GRINDING and FINISHING

● The Coated Abrasives Manufacturers' Institute has now embarked on a program to standardize belt lengths which promises tangible help to abrasive users, machinery builders and the abrasives industry itself.

An Institute committee took a long and searching look at existing belt specifications for machines which required belts from 12 through 168 inches in length. It tabulated an astonishing (and costly) 104 different lengths which fall between those limits, though it admits there may be some others it missed. Belts are being made to sixteenths of an inch, having added to the difficulty of manufacturing, complexity of ordering, and the inventory expense.

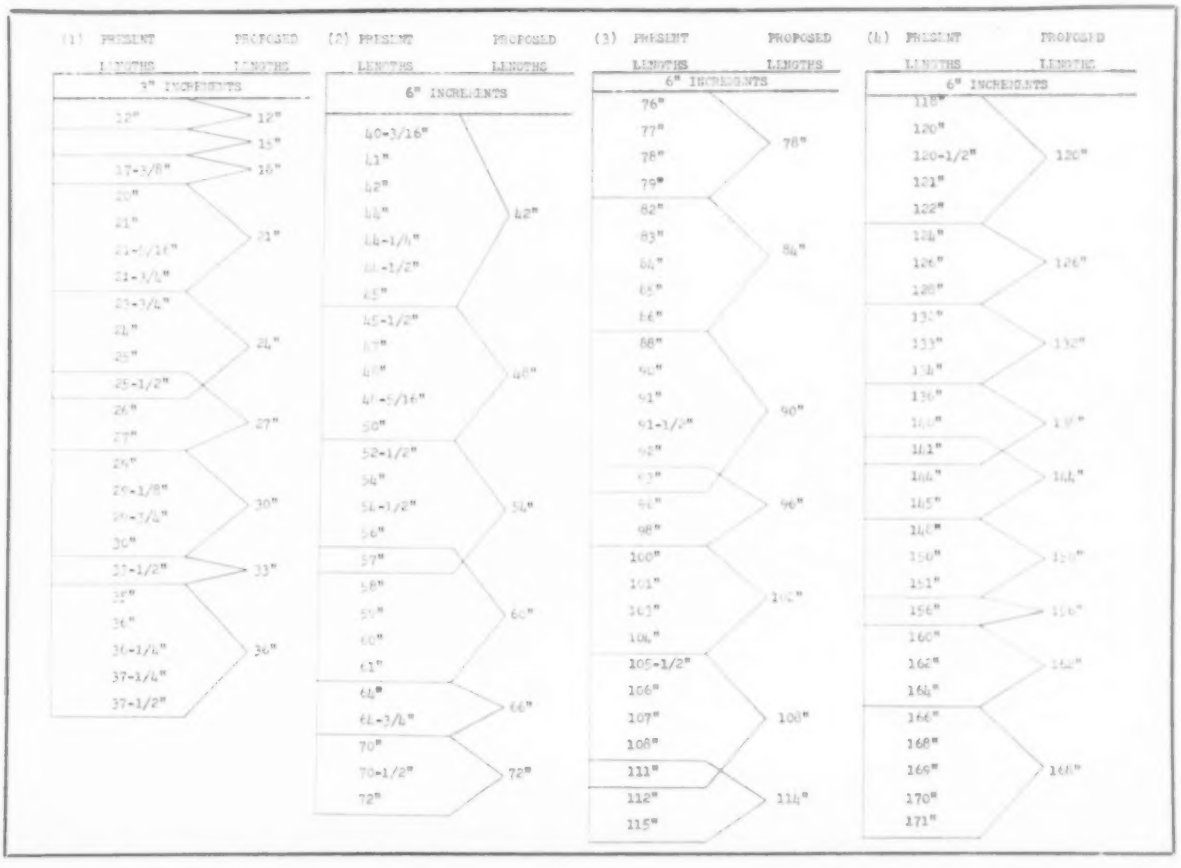
The committee applied its cumulative wisdom and experience to the situation, and presented a proposal it believed would bring relief without harassment: make belts in 31 lengths; from 12 through 36 in. in 3-in. increments, and from 42 through 168 in. in 6-in. increments.

Next, the committee approached machinery manufacturers, pointing out that of the 278 belt-using machines tabulated, 154 were already made to take one of the 31 proposed lengths, leaving 124 machines requiring other measurements. It asked machine builders to review any of their machines among the non-conformist 124 with a view to adjusting them to fit the nearest proposed standard, and to apply the new standards when designing new machines.

The committee suggested that existing designs might be modified inexpensively by revising tensioning devices or changing pulley diameters. It suggested that such steps would aid both industry and distribution, developing wider usage of belt machines as well as reducing dealer inventories.

Response from the machine industry has been prompt, generous and almost unanimously favorable—the exception being one or two firms which explained that patented features would be vitiated by the proposed change. Most respondents complimented the Institute on its program, and pledged fullest cooperation in the future.

Institute members include: Abrasive Products, Inc., South Braintree Mass.; Armour Alliance Industries, Alliance, Ohio; Atlas Abrasives Corporabtion, Greenwich, Conn.; Behr-Manning Co., a division of Norton Company, Troy, N.Y.; The Carborundum Company, Niagara Falls, N.Y.; Clover Manufacturing Company, Norwalk, Conn.; Michigan Abrasive Company, Detroit, Mich.; Mid-West Abrasive Company, Owasso, Mich.; Minnesota Mining & Manufacturing Co., St. Paul, Minn.; and Sandpaper, Inc., Rockland, Mass. Offices of the Coated Abrasives Manufacturers Institute are at 171 Third Avenue, New York City. • • •



Relief of Residual Grinding Stresses

By R. O. LANE
Member of Research Technical Subcommittee
Grinding Wheel Institute and Abrasive Grain Association

● Two methods have been found to be the most practical for relieving stresses produced by grinding which are of sufficient magnitude to decrease fatigue strength. These two methods are abrasive tumbling and a brief low-temperature salt bath annealing.

The Grinding Wheel Institute and Abrasive Grain Association sponsored a program at the Mellon Institute of Industrial Research to study the stresses and metallurgical changes in the surface of ground work as related to the kind of material, heat treatment and conditions of grinding, and investigate the possibility of reducing the stresses by practical and economical methods. The investigation of reducing stresses was carried out by Dr. Harold E. Letner[1] at the Mellon Institute of Industrial Research.

It should be noted that good grinding practice does not produce stresses of sufficient magnitude to decrease the fatigue strength of steel; it is possible to generate stresses which will increase fatigue strength; and abusive grinding which does not cause surface cracks will reduce fatigue life by only a small amount. But, when residual stresses due to grinding are of concern, the investigation has found that at least two of the six methods studied are of prime importance to the users of grinding wheels.

Six methods were found which offered some measure of stress relief. They are discussed in this report in general order of decreasing significance:

1. Abrasive Tumbling
2. Low Temperature Salt Bath Annealing
3. Aging
4. Lapping
5. Electrolytic Etching
6. Chemical Atmosphere

ABRASIVE TUMBLING

Abrasive tumbling has long been used for deburring, burnishing, descaling, etc., but until the recent work by the Abrasive Grain Association, little realization of the true value of this process was apparent. It definitely improves fatigue life, introduces compressive stresses into initially stress-free surfaces, and may drastically modify residual stresses in ground or heat treated surfaces. Abrasive tumbling technique is not likely to entirely eliminate all residual effects induced by

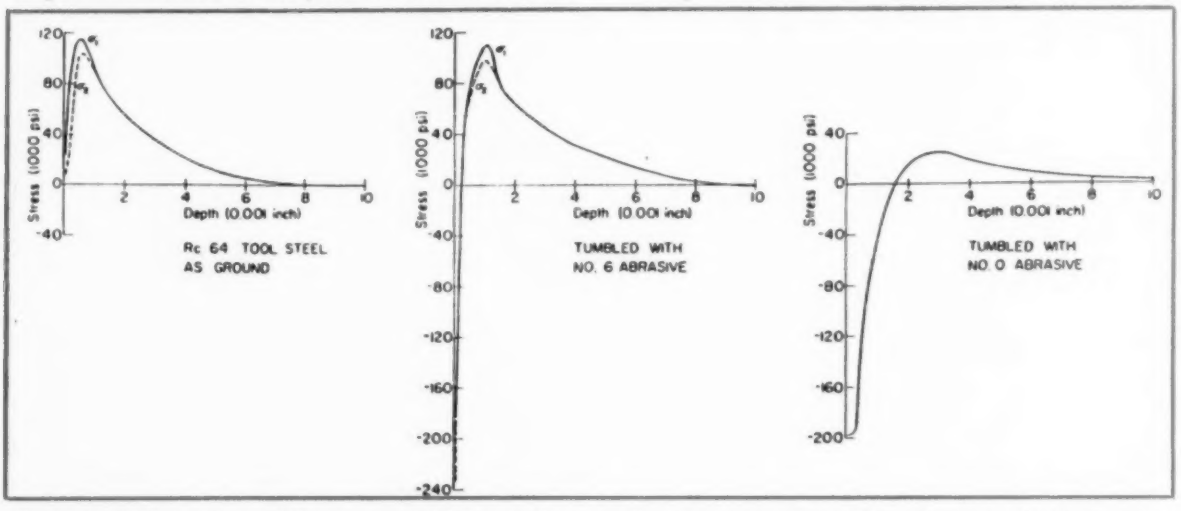


Figure 1. Effect of tumbling upon initial grinding stresses in Rc 64 steel. Solid and dash lines represent principle stresses parallel and perpendicular, respectively, to grinding marks.

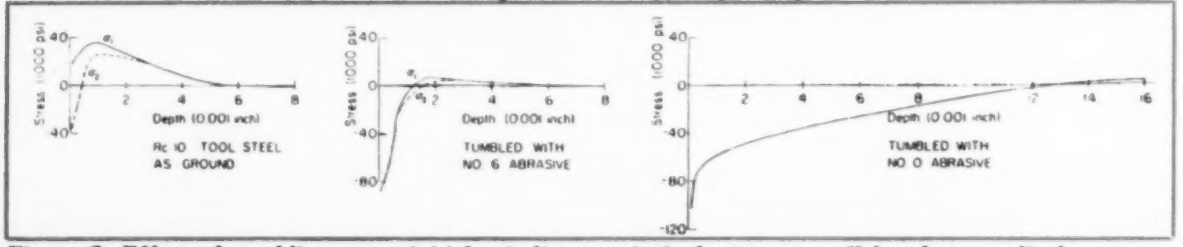


Figure 2. Effect of tumbling upon initial grinding stresses in Rc 10 steel. Solid and dash lines represent principal stresses parallel and perpendicular, respectively, to the grinding marks.

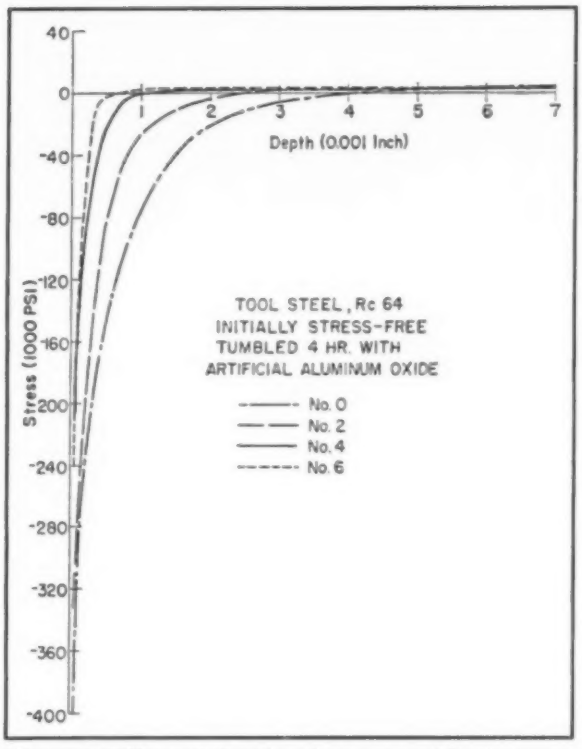


Figure 3. Effect of abrasive size upon residual stresses induced in fully-hardened tool steel by tumbling.

the grinding process but, also, induces its own compressive stresses.

The effects of abrasive tumbling on residual stresses were investigated using stress-free pieces as well as test pieces containing residual grinding stresses. The tumbling was done with No. 0 and No. 6 artificial aluminum oxide pebbles upon steel test pieces containing residual grinding stresses. The effects on residual stresses are illustrated in Figures 1 and 2.

The changes indicated in Rc64 Steel when tumbled by No. 6 and No. 0 abrasive are quite noteworthy, particularly in the case of No. 0 abrasive. Referring to Figure 3 which shows the effect of these two abrasives upon initially stress-free Rc64 steel, it is apparent that the grinding stresses in Figure 1 were modified to the same depths below the surface that abrasive tumbling was able to establish residual stresses in the stress-free specimen. This observation supports the belief that both the modification of the initial residual stresses and the introduction of residual stress into stress-free steel are the result of the same process; namely, the plastic deformation of the steel by the abrasive.

The greater effectiveness of the larger abrasive and the increased ease of modifying to greater depths the initial stress in the softer specimens are both apparent in Figures 2 and 4.

HEAT TREATMENT

The salt bath immersion procedure certainly appears to have merit. It is practical and economical, and special equipment in most cases would not be essential.

A method was worked out which met the requirements of the objective of this investigation, specifically—

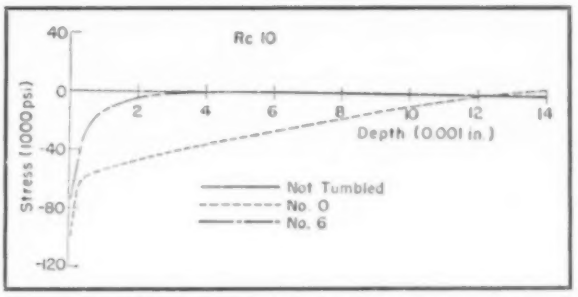


Figure 4. Effect of tumbling with No. 0 and No. 6 abrasive upon initial heat treating stresses in Rc 10 steel.

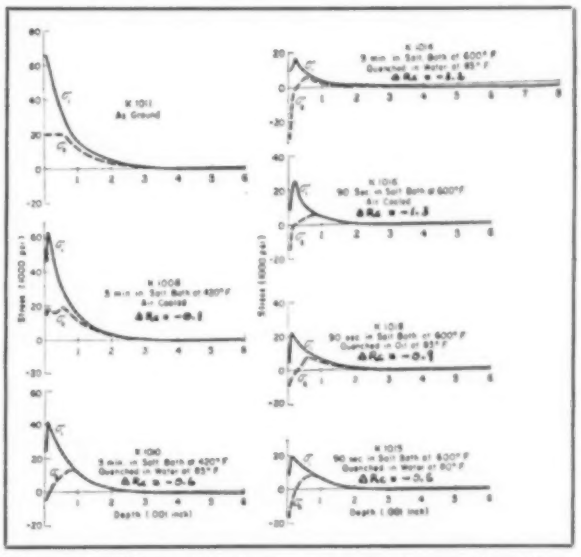


Figure 5. Effect of bath temperature, immersion time, and method of cooling upon residual grinding stresses in Rc 59 tool steel.

1. The process must effectively reduce the stress.
2. It must not lower the mechanical properties of the workpiece appreciably.
3. It must be simple and economical enough to be accepted in shop practice.

Briefly, the method consists of immersing the ground parts in a 500-600 degree Fahrenheit salt bath for ninety (90) seconds, then quenching in water. This treatment reduces tensile stress in the surface of Rc59 tool steel to about one-third of its initial value without seriously affecting the hardness of the steel.

As shown by Figures 5 and 6 several variations of this method were studied, all giving interesting data with respect to stress relief and hardness effects.

It is believed that the procedure of immersing ground parts into a low temperature bath for a measured interval of time, and then quenching in water, meets the requirements of simplicity. The ninety (90) second interval is easily measured, and the bath temperatures are not critical as Figure 6 illustrates. In fact, there is quite a wide range of temperature which is usable, depending upon the importance of relieving stresses as compared with maintaining hardness.

AGING

There were indications in which it appeared that relaxation may have modified the stress in the interval between grinding and sectioning.

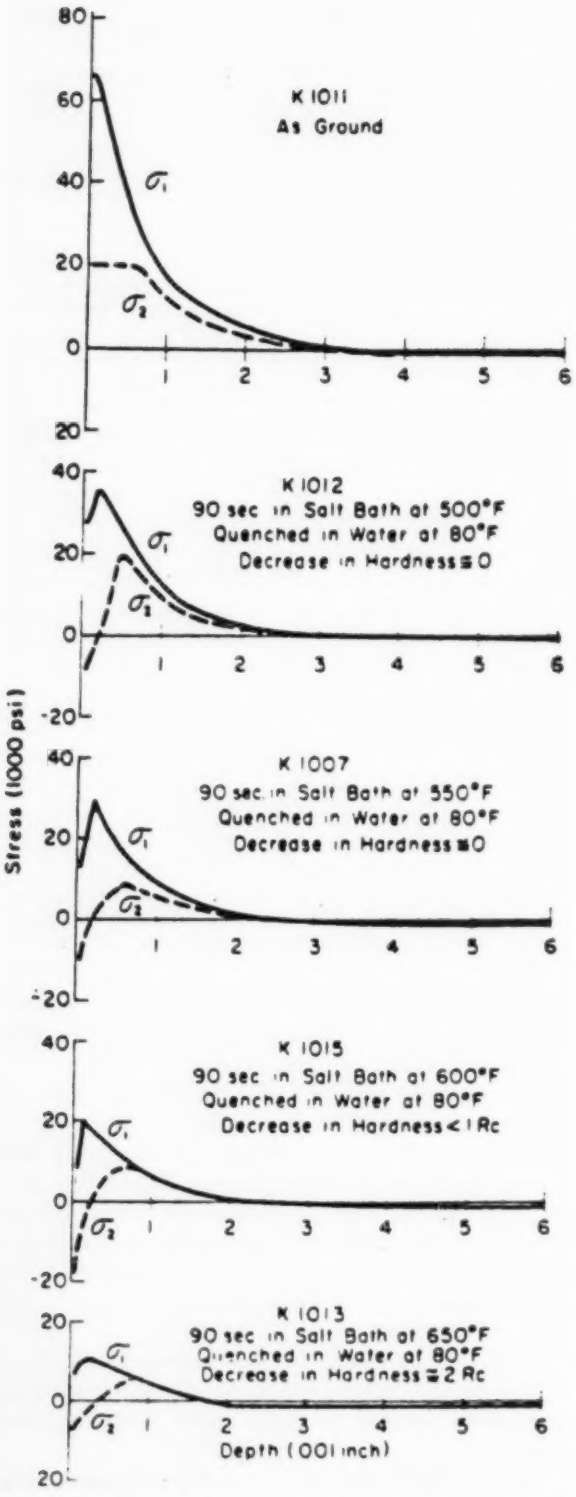

K 1011
As Ground
K 1012
90 sec in Salt Bath at 500°F
Quenched in Water at 80°F
Decrease in Hardness≅0
K 1007
90 sec. in Salt Bath at 550°F
Quenched in Water at 80°F
Decrease in Hardness≅0
K 1015
90 sec in Salt Bath at 600°F
Quenched in Water at 80°F
Decrease in Hardness<1 Rc
K 1013
90 sec in Salt Bath at 650°F
Quenched in Water at 80°F
Decrease in Hardness≅2 Rc
Stress (1000 psi)
Depth (.001 inch)

Figure 6. Effect of bath temperature upon residual grinding stresses in Rc 59 tool steel immersed 90 seconds and quenched in water.

Subsequent experimental work as seen in Figure 7 shows the stresses in all six specimens in generally good agreement at depths of 0.001 inches or more. At shallower depths, particularly within 0.0001 inches of the surface there are differences which appear to be quite large.

The results shown in Figure 7 illustrate that when specimens were sectioned simultaneously they were in better agreement than those sectioned at different times. These tests indicated that meas-

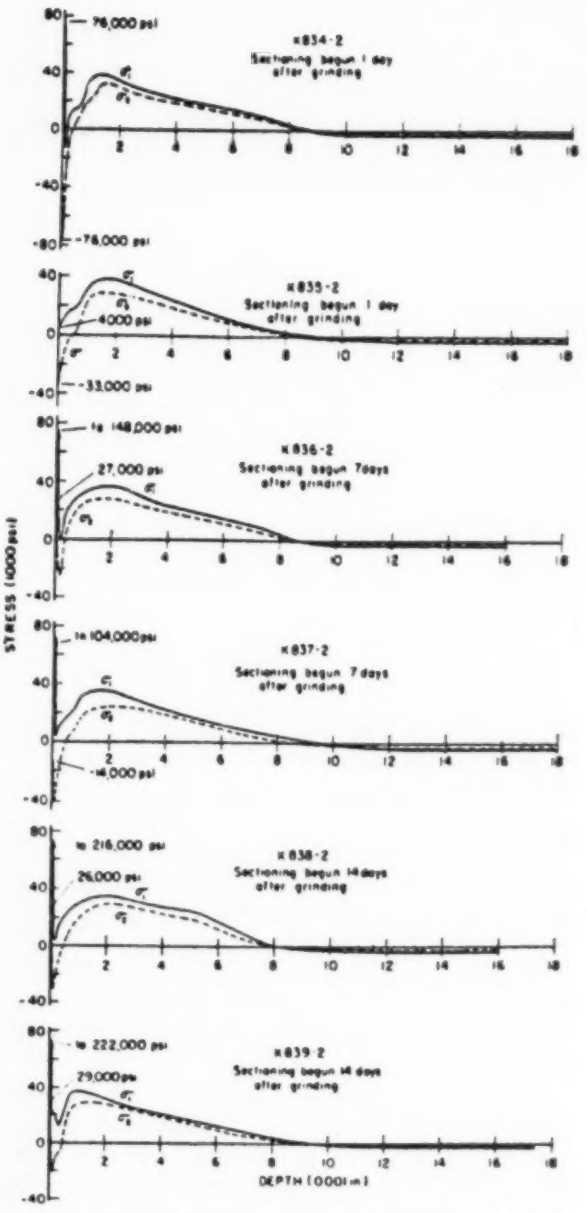


Figure 7. Residual grinding stresses in annealed tool steel specimens simultaneously surface ground. Sigma$_1$ and Sigma$_2$ are the principal stresses parallel and perpendicular to the traverse, respectively.

urable stress readjustments were possibly taking place within two weeks after grinding.

It became obvious that the anticipated relaxation as indicated in the early portion of the study never materialized in a positive manner, and certainly more basic investigation should be carried out before definite conclusions may be drawn about the "relaxation-by-aging-process".

LAPPING

The effect of lapping one side of initially stress-free specimens of annealed tool steel is illustrated in Figure 8. It is apparent that:

1. Curvatures caused by lapping under the conditions employed are negative, indicating a predominantly compressive stress in the lapped surface.
2. For given lapping conditions, lapping stresses remaining in the surface are constant, regardless of the length of the test or the

thickness of the layer removed.

3. Within the limits employed, lapping pressure does not influence the magnitude of the residual lapping stresses.
4. The lapping stresses extend to a depth slightly less than 0.0004 inches.

ETCHING

Removal of the few ten-thousandths of an inch of metal in tension at the surface can be accomplished by etching, leaving a surface which is in compression. Strictly speaking, the curves in Figure 9 represent the equilibrium stress before etching away any layers and not the stress at the surface after the removal; however, for values in the neighborhood of 0.0002 inches or 0.0003 inches, the difference between the two quantities is negligible.

This method is readily applicable to the study of phase changes resulting from grinding because it involves no mechanical working of the piece and is easily controlled. Its commercial application is not suitable for the removal of stress since:

1. There is a lack of controlled rate of removal of metal.
2. There is variation in amount of removal of metal.
3. It changes the dimension of the part.

CHEMICAL ATMOSPHERE

During one series of tests, a corrosive gas thought to contain hydrochloric acid came in contact with some freshly ground work, and this same ground surface immediately took on a tarnished appearance. When Dr. Letner attempted to get the initial curvature readings so that sectioning could begin, he found the curvature continued to decrease for several hours even though no action was being taken on the specimen. • •

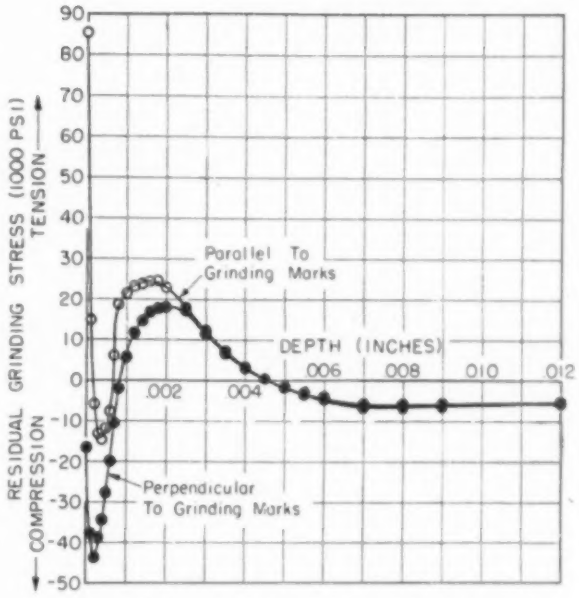


Figure 9. Effect of etching on residual stresses in ground specimens.

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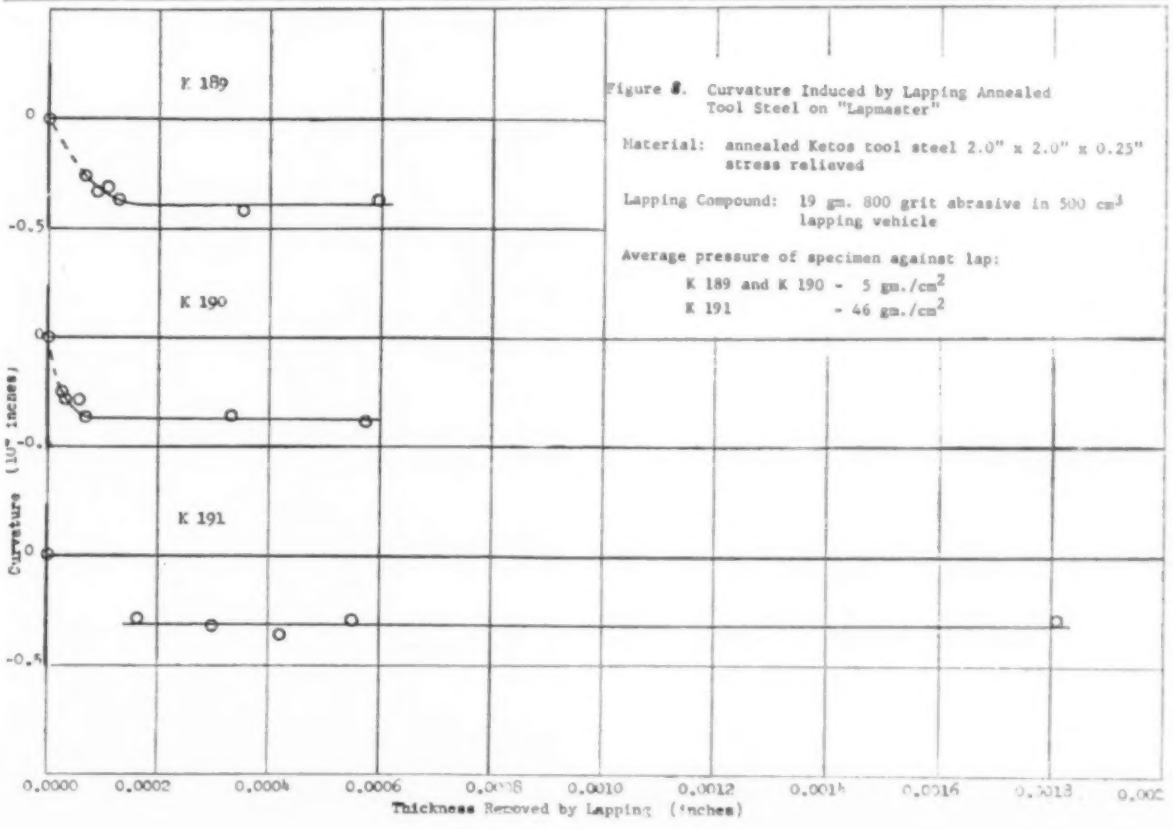

Figure 8. Curvature Induced by Lapping Annealed Tool Steel on "Lapmaster"

Material: annealed Ketos tool steel 2.0" x 2.0" x 0.25" stress relieved

Lapping Compound: 19 gm. 800 grit abrasive in 500 cm^3 lapping vehicle

Average pressure of specimen against lap:
K 189 and K 190 - 5 $gm./cm^2$
K 191 - 46 $gm./cm^2$

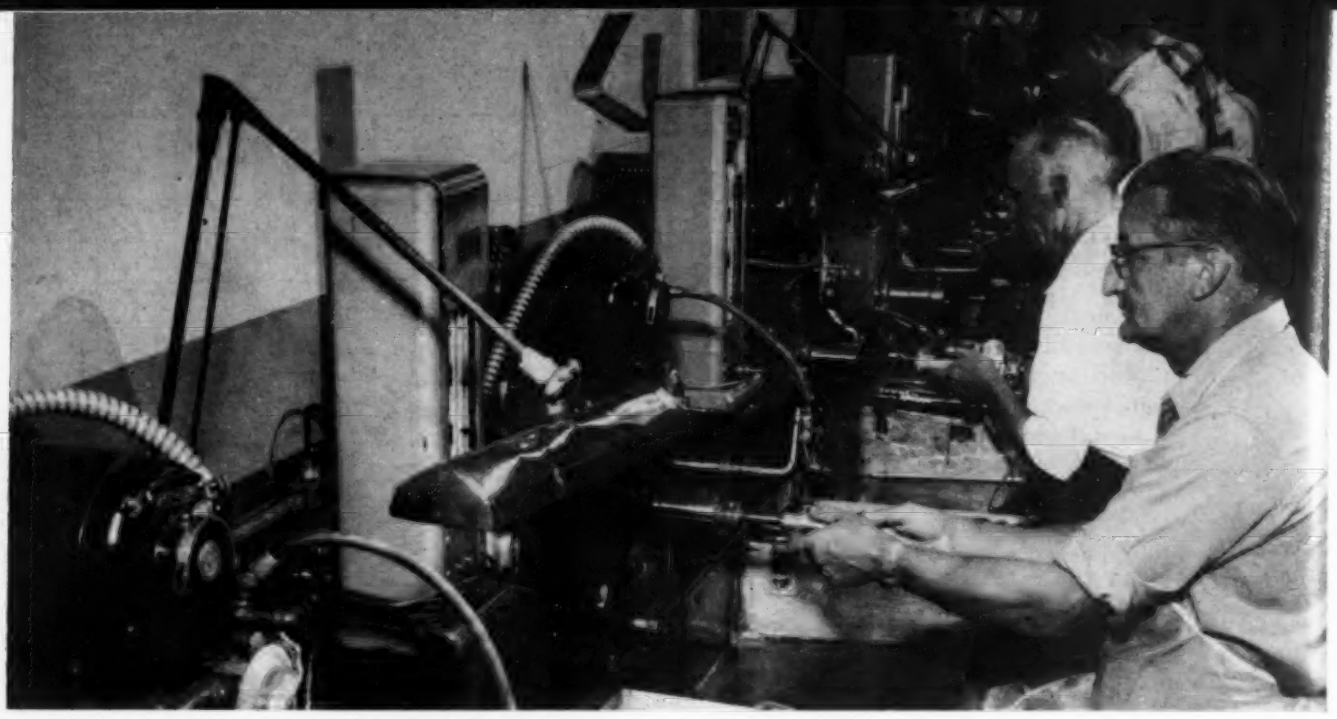

Fig. 1. Battery of eight manually-stroked honing machines in North American Aviation, West Coast plant.

Should You Use Manually Stroked Honing?

By B. R. McCONNELL, SR.
Honing Engineer
Sunnen Products Company

● An engineer, in determining the most suitable type of machine for honing small parts, should consider factors other than *estimated* production rates. Some shops have made considerable investments in power-stroked machines only to find these machines not suited to their particular work. In some cases like this expensive, automatic-type machines stand idle, while production proceeds on inexpensive, hand-stroked machines. Sometimes these power-stroked machines will be doing the roughing-out operation, while the manually-stroked machines are finishing the parts.

Many times these work-pieces have odd dimensions or characteristics, such as unusual ratio of length to diameter, interrupted bores, unevenly spaced lands, blind or shouldered holes, or wide-spaced tandem bores having uneven land widths. There are also many designs where weight has been trimmed to a point so that it is difficult to chuck or fixture the work without danger of distortion.

In choosing a honing machine for finishing bores in small parts the engineer, with the characteris-

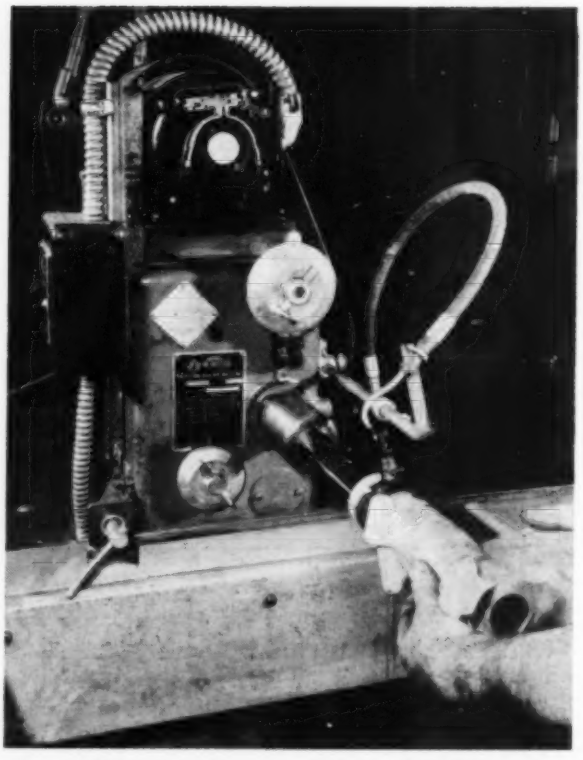

Fig. 2. Close-up of one operation, North American Aviation, hydraulic control housing.

Every method and most every type of equipment has an area of greatest advantage. To recognize and understand the advantages can be extremely beneficial. Manually stroked honing has areas of advantage which are outlined here.

tics of his product in mind, should consider the advantages inherent in hand stroking:

1) No fixtures necessary.
2) Ease of holding close tolerances.
3) Instant end-for-end reversal.
4) Instant change of stroke length.
5) Change stroke speed at will.
6) Pre-machining need not be consistent.
7) Ease of stone truing and dressing.
8) Ease of honing oil application.
9) Ease of honing blind or shouldered bores.
10) Operator's awareness of torque.
11) Operator's awareness of stone's performance.
12) General ease of operation by hand stroking.

Evaluation of Advantages

1. No fixtures necessary.

In any type of honing operation, either the tool or the work must float. If the work is chucked clamped or fixtured in any way, then the hone must be free to follow the work axis. Therefore such a system must employ a double universal effect in the drive shank to allow the hone to float.

In honing some small parts it is often best to avoid both holding fixtures and universal joints, just float the work. This saves the expense of fixtures, set-up time, and permits the use of simple, effective tooling.

Large aircraft manufacturers often use this last method (see Figures 1 to 5). Figure 1 shows the battery of eight manually-stroked honing machines in one department in the West Coast Plant, North American Aviation. Close-ups from this same group are shown in Figures 2 and 3. The work piece in Figure 2 is a hydraulic control body of light metal. Observe the length of the bore relative to its diameter, and the lack of any fixturing surfaces on the part's exterior. Figure 3 shows a work-piece with spaced tandem bores of small diameter in a delicate instrument bracket. Both parts require very close tolerances but are easy to hone by floating and reversing the work.

Figures 4 and 5 are photographs made in Chance-Vought's Texas plant where more than a dozen manually-stroked honing machines are in use. Figure 4 shows the honing of a long bore in a thin wall tubular-shaped part. Figure 5 shows the alignment honing of pressed-in tandem bushings in a light metal structural component. When honing in-line spaced bores, a honing tool length of slightly more than twice the work's center-to-center tandem distance is used.

In Figure 5 the lightweight, channel-shaped part is balanced across an outboard support, along which it slides. This outboard support also absorbs the honing torque. The hone accepts and maintains the center-line of the bores as previously established by fixtured cross boring of the bushing seats. The tandem bores being simultaneously honed on the long tool can be instantly reversed. Frequent reversal insures equal diameters within very close tolerances and keeps the hone trued up.

2. Ease of holding close tolerances.

When horizontal, manually-stroked honing machines such as shown here are used, the operator

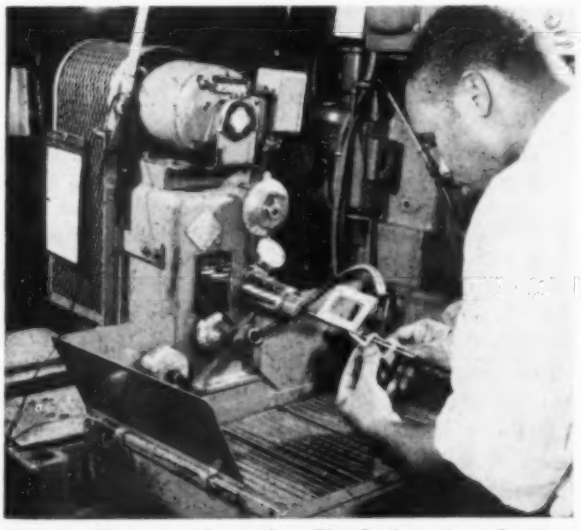

Fig. 3. Close-up of another North American honing operation, tandem bores in an instrument bracket.

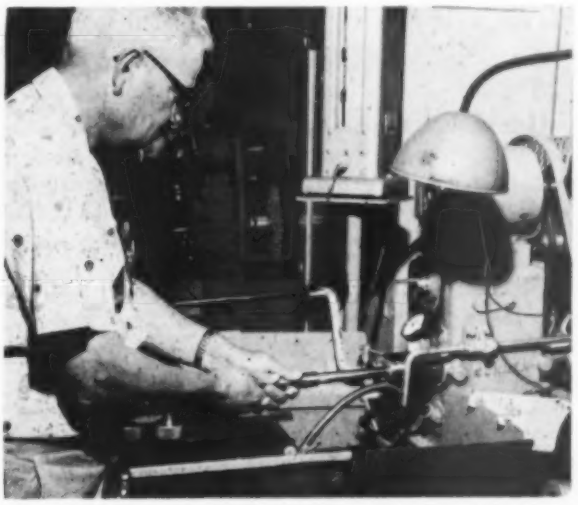

Fig. 4. Thin-walled tubular parts being honed at Chance-Vought's Texas plant. Free of "dogs" or clamps, no distortion.

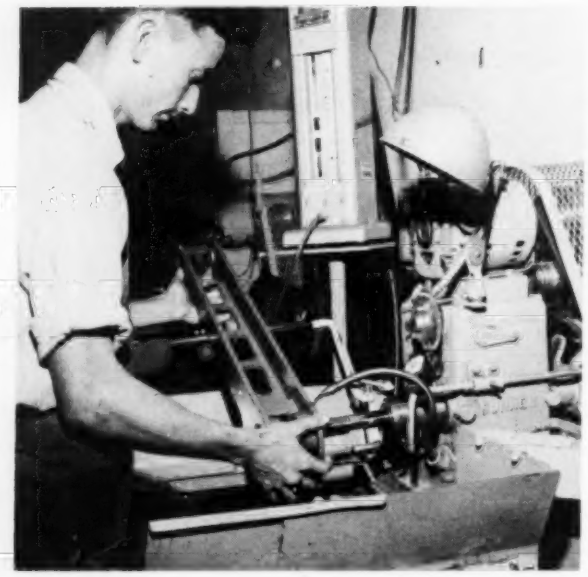

Fig. 5. In-line honing of tandem, bushed holes in a light-metal structural part. Chance-Vought's plant in Dallas.

notes the bore diameter's progress on a dial indicator built into the machine. He need not do any intermediate gaging as the operation proceeds, but need only gage when very near to size.

Gaging is convenient and fast as the operator has the part in his hand. He simply transfers the work from hone to gage in one motion. The stone feed-up is then advanced to finish size and the honing completed. There is a great advantage in the manual stroking of work that has extremely close tolerances. One can take work previously finished, slip it back on the hone, and increase the diameter a few "tenths" or even a few millionths, if desired. The work is self-locating, self-centering and stabilized by internal pressure on the hone as on an expanding mandrel.

3. Instant end-for-end reversal.

Honing stones are slowly perishable in use. Frequent end-for-end reversal averages the wear on the stone over its entire length, this keeps the stone straight. A straight stone generates a straight bore.

Being able to reverse the work offers an extraordinary opportunity to expedite any honing operation on work that has the bore open at both ends.

4. Instant change of stroke length.

Should work parts with tapered bores come to the hone, the operator can not only reverse the work frequently but can also overstroke either end at will. He can use short strokes at either end or in the middle, or even dwell in any part of the bore. The operator, feeling a torque increase at any point along the bore of the work, knows the bore to be small at that point. This great advantage is of course found only in the manually-stroked honing machine.

5. Change stroke speed at will.

The speed of the stroke movement, in relation to the speed of rotation, determines the work's surface pattern. A rapid stroke sets a steep cross-hatch pattern, a slow stroke movement imparts a circular pattern, so all in-between patterns are available when manually stroking. A steep cross-hatch keeps a stone sharp and obtains maximum stock removal. A moderate stroke ratio improves surface finish and aids in holding close tolerances. The operator as a rule starts honing each piece with a rapid stroke and shifts to a slower movement when near finish size.

6. Pre-machining need not be consistent.

The work can come to the manually-stroked honing machine in various conditions: with variations in stock to be removed, with variable tapers, or other shapes. This will have no ill effect on the operation. The operator need not even measure the parts prior to honing. When he starts honing, the automatic feed-up dial indicator tells him the amount of stock to be removed. The variation in torque indicates any taper and its direction. Any out-of-roundness is indicated by a bumping in the torque pressure. Through his sense or *touch* he is immediately aware of any irregular conditions in the bore

7. Ease of stone truing and dressing.

Stone truing and dressing in an efficient honing operation is, for the most part, continuous. In theory, the stone trues the work and the work trues the stone, which in turn keeps the work true. This is so in practice. When honing tools like the one shown in Figure 6 are used, the truing of the stone is further simplified. This design is based on two spaced metal shoes, opposed by one narrow stone, making a three-point, irregular-spaced contact with the work. In this design the metal shoes wear very slowly, and the stone always wears down parallel to the shoes.

As the stone will always wear parallel to the shoes, the operator need only check the straightness of the shoes once in awhile. Checking is done with a truing sleeve, which is an iron bushing having the same radius as the work and same length as the stones. The operator hones in this bushing with the honing oil turned off. The abrasive grit breaks loose from the stone's surface but is not washed away. It remains in the sleeve to abrade the shoes straight with proper stroking. The stone is automatically trued at the same time.

8. Ease of honing oil application.

In any honing operation the honing oil is jetted into the work bore at one end. It flows along the bore washing the cuttings out the other end. The oil is both a cutting lubricant and a coolant. Work of ordinary lengths offers no problem as to honing oil application. Extremely long work of small diameter, however, is often force lubricated by leading the oil into the outer end of the work through a flexible plastic tube. This is common practice when manually stroking certain types of work and is very effective.

9. Ease of honing blind or shouldered holes.

This type of work is more easily honed by manually stroking the work than by any other method. While the manually-stroked machine is equipped with an easily-adjusted, bottom stroke stop, often this stop is not needed. As a rule the end of the hone is allowed to tap against the bottom or shoulder. (This would be difficult indeed in power stroking.) In hand stroking, the operator can vary his stroke lengths (and sequence) to suit the work and do it instantly. A good example is a short, blind hole where the best procedure is to keep the bottom of the hole slightly larger than the mouth until near finish size. It is easy to take the excess stock out at the mouth of the bore on finishing (or at any other time).

Short blind holes, of course, call for altered tooling (shortened shoes and hard-tipped stones) and proper stroking. A series of several short bottoming strokes (with some dwelling at the bottom), mixed with a few longer strokes up to and slightly over-running the open end, gives the best results. Note the shape at the bottom of the aircraft hydraulic cylinder shown in Figure 7, and the honing tool used to over-run the relief in the blind end.

10. Operator's awareness of torque.

The operator's constant awareness of torque during honing is a great advantage. Any variance in torque during a stroke indicates a variable in diameter, telling the operator exactly where the bore is open or choked. When the operator starts honing a new part he is immediately aware of the bore's shape and adjusts his stroke accordingly.

If pre-machining has left the bore ever so slightly out of round, the operator is aware of this the second he starts honing. He feels a double bumping in the torque. As the bore rounds up, the torque evens up, and the operator knows the bore is round. Even in honing heavy work where the torque is being absorbed by an outboard support, the operator still has his hand on the work and is fully aware of what is going on inside the bore.

11. Operator's awareness of stone's performance.

While operating a hand-stroked machine the operator feels the cutting action of the stone. A slight but easily recognizable quiver can be felt in the work when the stone is cutting; producing a vibratory sound easily identified. The operator knows the second this shearing action stops and can instantly take action to counter—increase stone pressure or change the stroke rate. If these measures fail, he can scratch the stone surface to sharpen it.

There are other constantly evident indications of the stone's performance. When a stone glazes and torque drops, the work temperature rises. A skidding stone generates more heat than a cutting stone. A loaded stone sets up a rough grating vibration easily detected by the operator.

The most important aid to efficiency in honing is for the operator to know at all times how the stone is performing. The operator of the manually stroked honing machine always takes advantage of this knowledge to expedite his production and avoid any scrap.

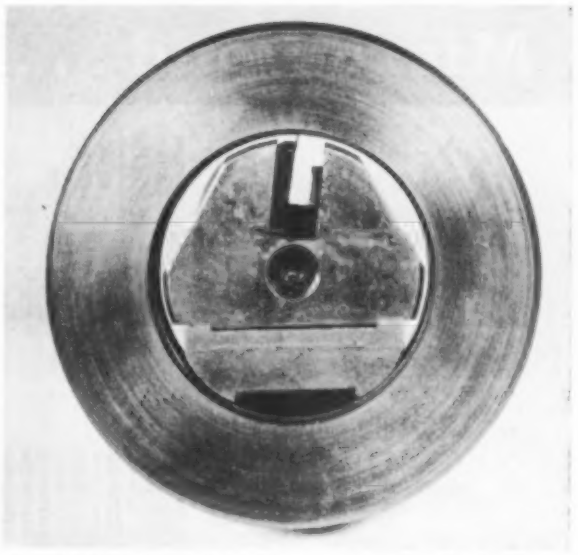

Fig. 6. End view of honing tool in a work bore. Note the three point, irregular-spaced contacts, two metallic, one abrasive.

12. General ease of operation by hand stroking.

No time is lost in a hand-stroked honing operation, no shifting of mechanical reversal stops and trial honing before attempting production is required, nor does each new batch of work require resetting of stops because of pronounced pre-machined differences.

A decided variation in pre-machined shape, by lots, is common in production, and also a decided difference in end-for-end surface roughness often occurs, such as pronounced reamer marks in one end of the bores. Other variable conditions caused by heat treating, shrink distortion, scale, etc., can easily be compensated for with hand-stroking.

On a manually-stroked machine, almost anyone, even without mechanical background, can become a proficient operator in a few days. Where the parts are light, women make good operators and seem to like the job. Given a means of gaging with a high amplification, they will easily hold close tolerances and achieve high rates of production.

The low cost of tooling, the advantages of quick changeover from one job to another, and the variety of jobs and sizes handled, clearly shows that hand-stroked machines are a profitable investment—not only for job lot work, but also where certain type production runs must be made economically. • • •

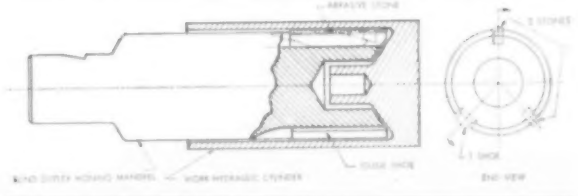

Fig. 7. This drawing shows the design of the honing tool used in the blind end with hub. Note the relief which has been provided for over-run.

Micro-Bond® HONING STONES

by MID-WEST

Uniform grain, grade and dimension

Today honing is a high production practice. But it was not always so. Not too long ago, honing on a high production basis was difficult due to the undependable characteristics of stones then available. Stones supposedly identical in grade were found to be of varying grade. Since hones are generally used in groups of "sets", it was entirely possible that one or more stones within a set could vary in hardness from the grade of the others within the set. It was almost impossible to predict what a stone or set of stones could do on any given operation.

If high production honing was to be successful, the variables and guess work had to be eliminated. It was necessary to produce stones having uniform values in grain, grade and dimension. The uniformity of these stones had to be controlled to a fine degree.

Mid-West engineers began the research work that resulted in the development of the Mid-West Micro Bond honing stones. These laboratory controlled honing stones will produce finer finishes, AND remove stock faster than most other abrasive methods. Micro Bond honing has also proven successful in generating true holes, free from taper, out-of-roundness, and axial distortion. Try a dependable Micro Bond stone and start HIGH PRODUCTION honing today!

Mid-West . . . the only abrasive company that offers a complete line of mounted and unmounted honing stones.

A typical honing operation showing how compressor cylinders are honed.

MID-WEST ABRASIVE COMPANY

OWOSSO, MICHIGAN

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Literature

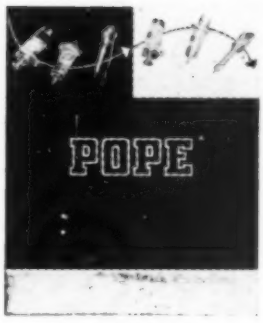
1. Spindle Repair Service. Extensive facilities for prompt repair and renewal of all makes and sizes of belt-driven, motorized, and high-cycle spindles for grinding and other machining operations are detailed in this four-page pamphlet. Pope precision methods and equipment for assembly, dynamic balancing, and electronic testing of rebuilt spindles are described. Handling instructions are given for fast, low-cost repair service. Bulletin R-3. Pope Machinery Corporation, 261 Rover Street, Haverhill, Massachusetts.

2. Portable Abrasive Blaster. Punched for standard three-ring binder, this four-page bulletin in two colors gives complete details about the "Handi-Blast," said to be the only pressure type abrasive blaster that is actually portable. Abrasive capacity is about 30 pounds; empty weight of the unit is 23 pounds. The abrasive load will run from 15 to 25 minutes. Form No. HB5360. Hamill Manufacturing Co., Inc., Washington, Michigan.

3. Preformed Tumbling Media. Four-page mailer describes the Fortune Industries line of preformed media for barrel and vibratory finishing operations. Media are available in seven standard shapes, with others available on special order. Various types of media are listed, with color, material, approximate grit size, rate of cut and resulting finish, and suggested applications for each type. Fortune Industries, Inc., 11770 Dexter Road, Chelsea, Mich.

4. Numerically Controlled Machine Tools. A new 12-page brochure contains general information on numerically controlled machine tools and describes three specific types of machines in use today. Printed in two colors, the book contains many photographs. Two of the three machines described, all of which were designed and built specifically for numerical control, perform grinding operations. Bulletin 5060125. Ex-Cell-O Corporation, 1200 Oakman Blvd., Detroit 32, Michigan.

5. Masonry Cutting Products. Clipper Manufacturing Company has brought out a new brochure covering all products used in the cutting of masonry materials. The packet contains information on SuperMatic masonry saws; diamond, reinforced, and abrasive blades; and a catalog type price list showing Clipper's complete line of products for construction and industry. The Clipper Manufacturing Company, 2800 Warwick, Kansas City 8, Missouri.



(See Number 1)

(See Number 4)

(See Number 7)

6. Pneumatic Grinder. Catalog page punched for standard binder gives data and advantages of the "M-B" Cyclone pneumatic grinder. An illustrated and numbered service parts list and a list of extra parts and accessories complete the piece. Bulletin No. 1006-A 60. M-B Products, Inc., 46 Victor Avenue, Detroit 3, Michigan.

7. Single-Spindle Vertical Grinder. Colorful four-page pamphlet highlights the special features and general specifications of Frauenthal's 1200 series vertical grinders, for contour and other grinding. Optional equipment and accessories are also listed. Short listings are included for four other series of Frauenthal grinders. Bulletin 1260. Frauenthal Division, The Kaydon Engineering Corp., Muskegon, Michigan.

8. Grind-All Fixture. Harig's improved Grind-All fixture for grinding irregular shaped perforators is fully treated in a new brochure just issued. The piece outlines several new features on the latest model fixture, and includes information on Harig's radius dresser arm and ball-seat punch adapter. Harig Manufacturing Corp., 5751 West Howard Street, Chicago 48, Illinois.

9. Portable Polishing Stand. Single-sheet flier features the "John Crane" portable polishing stand for fine grade polishing paper, which holds a 50 yard roll of 12" wide paper and which is said to eliminate difficulties in holding the paper taut, as well as reducing time for replacing worn sections. Metal polishing plates are also described. Crane Packing Company, 6400 Oakton Street, Morton Grove, Ill.

10. Grinding Rods. Colorful four-page folder presents data and case histories for Diamonite® grinding rods for use on ceramic materials, glazes, enamels, and similar materials in ball or pebble mills. Diamonite is a synthetic sapphire substance, composed of fine-grained aluminum oxide crystals held together by a non-metallic vitreous bond. The faster grinding action and longer service life are said to reduce drastically the cost of media per ton of material processed. Diamonite Products Manufacturing Co., Shreve, Ohio.

(See Number 8)

To obtain literature use Reader Service cards on page 49. Circle on the card the number which appears at the start of the paragraph describing the literature you request.

FREE LITERATURE *continued*

11. Safety Quarterly. A new publication, the "Willson Protector," an eight-page quarterly, is now being published by Willson Products. The magazine is editorially concerned with improved safety methods, equipment, and ideas. Case histories about the successful use of Willson safety equipment by leading companies are a major feature. Willson Products Division, Ray-O-Vac Company, Second and Washington Streets, Reading, Pennsylvania.

12. Abrasive Belt Unit. A dozen different applications of the G & P 6-72 abrasive belt unit to machines of various kinds are featured in a gatefold flier punched for standard binder. The unit is listed as being used for almost every type of belt grinding within the capacity of its 2½" belt and 2 hp motor. Standard specifications and accessories are shown on the last page of the flier. Bulletin No. 104. Grinding and Polishing Machinery Corporation, 2530 Winthrop Avenue, Indianapolis 5, Indiana.

13. Abrasive Finishing Methods and Materials. The Lea Manufacturing Company is publishing a series of data sheets, punched for three-ring binder, with information as to compounds, type of buff, and buff speeds for producing various finishes on metals. Four such sheets, covering zinc, silver, copper, and chromium, have been received, and eight are listed as having been published. The Lea Manufacturing Company, 16 Cherry Avenue, Waterbury 20, Connecticut.

14. Precision Measuring Device. Folder explains what is said to be a "new photographic imaging technique in the field of super fine precision measurement . . . an entirely new approach to the science of precision measuring, independent of any screw, slide, or propelling mechanism." The master 24" Micro Scale has been certified to an over-all accuracy of .0001" by the U. S. Bureau of Standards. The device is claimed to give direct readings in "tenths." Micro Line, Inc., Jamestown, New York.

15. Sandblast Nozzles. Diamonite's line of "Double L" sandblast nozzles is the subject of this four-page flier. Among the advantages claimed for the line are high wear resistance, faster cutting, resistance to breakage, and lower hourly operating costs. Nozzles are available in three standard styles, can be furnished to customer requirements for most standard blasting equipment. Diamonite Products Manufacturing Co., Shreve, Ohio.

16. Automation Components. Automation components and entire assembly machines to meet today's production requirements are pictured, and their special purposes are clearly explained, in a 46-page catalog issued by Precision Detroit Company. A number of index tables, dial assembly presses, rivet spinners, and special assembly machines, along with tooling and automatic feeds, are shown. Catalog 60. Precision Detroit Co., 20100 Sherwood, Detroit 34, Michigan.

(See Number 12)

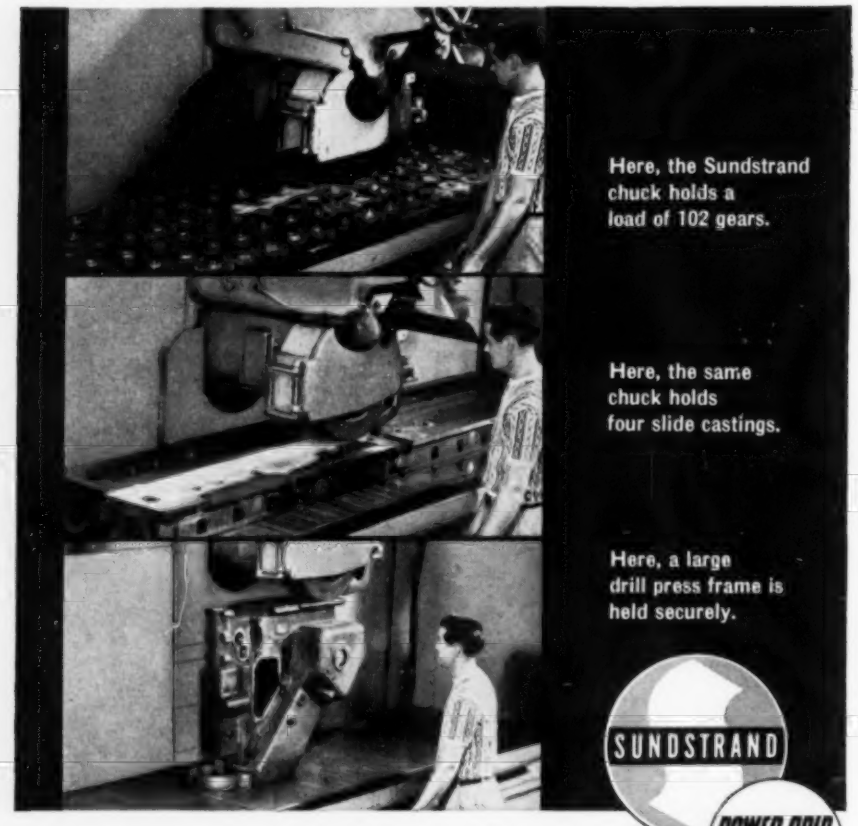
17. Belt Sander Attachments. Six-page gatefold flier provides specifications and illustrations of four air-powered industrial belt sanding attachments and five belt grinding attachments for portable grinders. The units are particularly recommended by the manufacturer for finishing contours and complicated radii. The Jonvir Manufacturing Co., 25120 Ryan Road, Warren, Michigan.

18. Pitch Diameter Comparator. A new indicating comparator, combined with three-wire carriers, is said to provide the fastest, most accurate method of measuring thread pitch diameters with the accepted standard three-wire method. Advantages claimed for the instrument are three-wire inspection on a production basis and reduction of gage inventory, since the comparator can be used on roving gage surveillance. Six-page gatefold brochure, punched for standard three-ring binder. Standard Gage Company, Inc., Poughkeepsie, New York.

19. Filtering Equipment. Descriptive literature concerning the applications and specifications of Roltray filtering equipment for machine tools has been made available. Filter fits grinders, hones, and machine tools. Advantages and the low cost of the unit are stressed. Industrial Filters Co., P. O. Box 160, Montclair, New Jersey.

One Sundstrand magnetic chuck holds all sizes of parts machined on this grinder . . .

Small, medium, or large parts, the deep penetrating power of a Sundstrand magnetic chuck holds them securely, simplifies set-up, and eliminates clamping time. Get complete information—ask for Bulletin A-370.


Here, the Sundstrand chuck holds a load of 102 gears.
Here, the same chuck holds four slide castings.
Here, a large drill press frame is held securely.
SUNDSTRAND
POWER-GRIP

SUNDSTRAND MAGNETIC PRODUCTS

SUNDSTRAND-AMERICAN BROACH • Ann Arbor, Michigan

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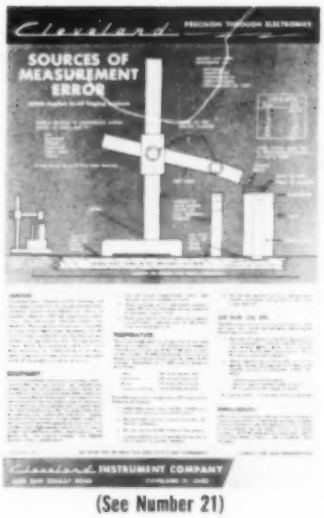
20. **Barrel Tumbling Equipment.** A new catalog sheet describing Tumb-L-Matic's line of LS Type barrel tumbling equipment for finishing and definning plastic and metal parts by the dry process is available. Tumb-L-Matic, Inc., St. Mary's Street, Stamford, Connecticut.

21. **Gaging Wall Chart.** A wall chart, "Sources of Measurement Error," which can be applied to all gaging systems, has been made generally available by The Cleveland Instrument Company. Prepared with the aid of the nation's leading gaging authorities, the chart has quick reference diagrams and explanations of factors producing measurement errors, methods for avoiding these errors, procedures for getting the greatest accuracy from your gages, and simple experiments for training new inspectors. The chart is printed on heavy coated stock suitable for hanging on shop or lab wall. Cleveland Instrument Company, 6220 E. Schaaf Road, Cleveland 31, Ohio.



(See Number 21)

22. **Tungsten Carbide Master Balls.** Two-page flier (Bulletin P-41) illustrates and gives specifications and prices for sets and individual tungsten carbide master balls, while technical bulletin B-41 describes methods for their use. These non-

(See Number 17)

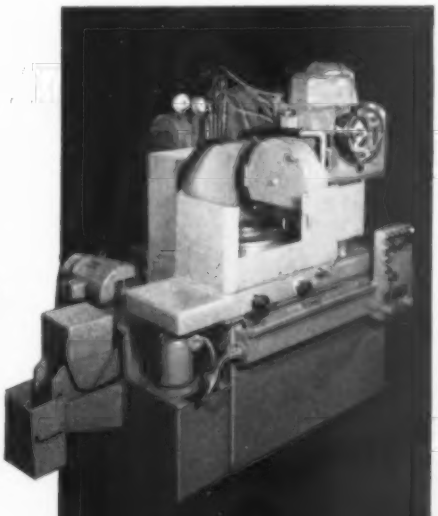
rusting, dimensionally stable balls are said to be ideal for checking comparator gages and for many other applications in shops, tool rooms and gage rooms. Available from stock, in 31 sizes from 1/16" through 1" by 1/32" increments. Industrial Tectonics, Inc., 3686 Jackson Road, Ann Arbor, Michigan.

"It's a 'special-purpose' wheel."

23. **Abrasive Belt Grinding Machines.** A 27-page brochure discusses in detail the complete line of "Hill" 2-Roll Vertical abrasive belt grinding and polishing machines manufactured by The Hill Acme Company. Large fold-out pages show several of the standard machines, while close-ups show details. The Hill Acme Company, 1201 West 65th Street, Cleveland 2, Ohio.

24. **Vertical Contour Grinder.** Precision production machines for contour and conventional grinding are described in a new four-page 900 Series bulletin by Frauenthal Division. The Kaydon Engineering Corp. The bulletin describes the custom designing service of Frauenthal, to provide vertical machines in many configurations to meet customer requirements, using building block construction. Standard and optional features, including tracer and numerical control, are detailed. 900 Series Bulletin. Frauenthal

This Sundstrand-Arter grinder available for toolroom or production grinding...



. . . toolroom type is fed down manually in preset increments, then switched to automatic repeat . . . production type rapid advances to work, then automatically feeds in preset increments. First strokes are rough grinding feed with automatic change to finish. Machine stops and retracts when part is completed.

MODEL E FEATURES

- Rugged column and long ways permit both heavy stock removal and fine finishes.
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- Rough and fine wheel feeds permit both operations in same machine.
- Compensation for wheel wear or wheel dressing doesn't disturb feed setup.
- Sundstrand concentric pole magnetic chuck is standard equipment.

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SUNDSTRAND MACHINE TOOL • Belvidere, Illinois
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FREE LITERATURE continued

Division, The Kaydon Engineering Corp., McCracken Street, Muskegon, Michigan.

25. Portable Sand Blaster. A new two-page flier in color on "Sandy Jet", outlines complete specifications on the new Model B, said by the manufacturer to have twice the blasting power available in previous models. ALC Company, R. D. No. 5, Box 40, Medina, Ohio.

26. Dual-Purpose Casting Cleaning Equipment. An informative brochure on dual-purpose core knock-out and blast cleaning equipment for the foundry industry gives a step-by-step description of the two cycles. The folder contains diagrams and drawings of the machine—how it works, photographs of castings before and after core knock-out and cleaning, and case history information. Also listed are examples of savings on a variety of sizes and types of castings that are now being made by firms that have replaced equipment for the separate operations with this dual-purpose machine. Wheelabrator Corporation, 1169 S. Byrkit Street, Mishawaka, Indiana.

27. Grits and Grinds. The June issue features three articles, one describing new shapes of barrel-finishing media, one about the new Norton automatic wheel balancer, and the third concerned with steadyrest grinding. Norton Company, 3 New Bond Street, Worcester, Mass.

99. Sheet Polishing Mills. An eight-page two-color illustrated catalog describes Acme sheet polishing mills for finishing metal sheets, plates and coils. Construction, operation, and specifications of the mills, and information on their application as individual units or in tandem are discussed in detail. Also included are typical polishing case histories and two-color floor layouts. Acme Manufacturing Company, 1400 East Nine Mile Road, Detroit 20, Michigan.

(See Number 27)

28. Gear Finishers. Eight-page bulletin describes a new line of Michigan Tool Company gear finishers. In addition to picturing and describing the features that are exclusive, the text covers three methods of shaving: underpass, transverse, and modified underpass, and shows how set-up procedures are simplified. Michigan Tool Company, 7171 East McNichols Road, Detroit 12, Michigan.

29. Power Chucks. A recent bulletin, Catalog 5760, describes a new line of PowerGrip universal power chucks with large through holes for bar and chucking work. Air or hydraulically operated, these are said to combine the wide adjustment of a manual chuck with the time-saving advantages of a power chuck. Features, specifications, and dimensions of the unit are spelled out. PowerGrip, Inc., Rockfall, Connecticut.

30. Compounds for Metalworking. Pocket-size brochure tells how to select grinding oils, cleaners, cutting lubricants and other compounds. The selector includes 46 compounds for all types of metal and processing conditions, yet it is said to be only a partial list of Macco compounds. Macco Products Company, 9210 S. Sangamon Street, Chicago 20, Illinois.

31. Two-Jaw Indexing Chucks. A new four-page, two-color folder describes the Cushman line of power and manually operated two-jaw indexing chucks. These chucks are said to enable manufacturers to perform multiple precision machining operations on complex workparts in but one chucking operation. Photos of these applications and cross sectional drawings of the index chuck, as well as text fully detailing its construction are included in the bulletin. Bulletin 800. The Cushman Chuck Co., 806 Windsor Street, Hartford 2, Connecticut.

Wider lip design of ATLANTIC Resin-Bonded CUP WHEELS provide maximum strength for continuous high-speed smoothing jobs. Faster, safer – wheels from 2½" to 8" are speed tested at 50% higher than normal snagging speeds . . . wear longer, seldom need to be dressed. Good reasons why you keep cutting costs down with Atlantic Wheels.

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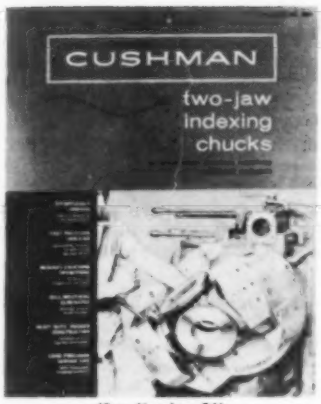

(See Number 31)

32. Abrasive Belt Grinding and Polishing Machine. Four-page folder with insert page, well-illustrated, gives specifications and details on Mattison's No. 457 compact abrasive belt grinding and polishing machine. Insert shows in cross section the three-roll principle by which the driving roll pulls the belt over the contact roll, as against the conventional construction in which one roll doubles as contact and driving roll. No. 457. Mattison Machine Works, 545 Blackhawk Park Avenue, Rockford, Ill.

(See Number 32)

33. Gaging Instrumentation. A first product brochure by Measurement Control Devices, a wholly-owned subsidiary of Schaevitz Engineering, describes in detail their systems and components for the continuous indicating and monitoring of minute changes in dimensions for control purposes. Catalog G-100. Measurement Control Devices, P.O. Box 505, Camden, New Jersey.

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J.K.S. Diamond Wheel Developments
Slash Grinding Costs—Speed Production

Now, one of the world's most experienced manufacturers of diamond grinding wheels has brought its technical knowledge to the production of man-made diamond wheels.

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In these wheels, too, you get a famous J.K.S. plus value: exact uniformity in wheel construction . . . duplicated in wheel after wheel . . . an advantage that results from special J.K.S. techniques and quality control.

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FREE LITERATURE *continued*

34. New Tools and Technology for Surface Finishing. Two-color folder explains and gives details on four models of Microstoning attachments and machines, the Taft-Peirce No. 1 precision surface grinder, and their 24" semi-automatic lapping machine, as well as discussing the Taft-Peirce custom machine design and installation service. Taft-Peirce Manufacturing Company, 13 Mechanic Avenue, Woonsocket, Rhode Island.

35. Machine Tool Catalog. A newly-revised 52-page catalog describes the complete line of light-heavy-weight machine tools manufactured by Rockwell Manufacturing Company's Walker-Turner Division. Some of the industrial tools described are Walker-Turner's grinders, cut-off machines, and belt and disc grinders. Complete specifications, listings, and descriptions of accessories for all tools are included in this two-color catalog. Photos and drawings supplement the text. Catalog WT-50 Rev. 3. Rockwell Manufacturing Company, Walker-Turner Division, 400 North Lexington Avenue, Pittsburgh 8, Pennsylvania.

36. Handling, Storage, and Inspection of Grinding Wheels. Pocket-size booklet outlines methods for handling and checking wheels in accordance with the ASA Safety Code and accepted practices. Photos and drawings illustrate approved storage racks and the "ring test" for wheels. Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.

37. Ballscrew Assemblies. A new 8-page illustrated brochure in color details Kidde® ballscrew assemblies, their applications and their design-operation characteristics. These assemblies are said to operate efficiently under severe conditions and to be sufficiently reliable to be fitted into apparatus that is completely inaccessible after installation. Kidde Aero-Space Division, Walter Kidde & Company, Inc., Belleville 9, New Jersey.

38. Lapping and Grinding Compounds. A 16-page booklet just issued by Clover Manufacturing Company provides general data on machine and hand lapping. Basic rules and standard practices are outlined. Suggestions for some of the less-common applications, it is said, may bring to mind still other uses of the lapping process for those interested in accurate surfaces. A list of shop kinks is also included. Clover Manufacturing Company, 327 Main Street, Norwalk, Connecticut.

39. Honing Machines and Processes. A new 16-page catalog discusses internal, external, and straight-line honing. It also outlines the development of honing, explains the honing process, and illustrates typical honed parts. Charts list spindle speeds and coolants for various honing operations. Also included are illustrations and specifications for the Barnes line of honing machines, tools, and abrasives. Catalog No. 200. Barnes Drill Co., 886 Chestnut Street, Rockford, Illinois.

(See Number 34)

40. Flat Surface Finishing and Deburring Machines. A new four-page, two-color illustrated catalog describes the complete Acme line of flat surface grinding and polishing machines for finishing and deburring such parts as sheets, bars, strips, stampings, forgings, die castings and sand castings. Machines covered in the catalog include: a conveyor belt type machine designated model KC, for high production polishing and deburring of miscellaneous shapes with flat surfaces; a pinch roll type machine, for sheet, coil and bar stock, model KP; and nine other abrasive belt machines. Acme Manufacturing Company, 1400 East Nine Mile Road, Detroit 20, Michigan.

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Houston 11, Texas
Tel.: Walnut 3-7687

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Keefer at Jefferson
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Tel.: 1450

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185 South Newman Street
Hackensack, New Jersey
Tel.: Hubbard 7-3212

HAMILTON, ONTARIO
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100. **Sam Safety Posters.** A single copy of the current Sam Safety poster, or of any one of the thirteen which have preceded it, 8½" x 11", on 100# enamel, is available on request. Circle No. 100 on the Reader's Service Card. Nos. 1-11 (September, 1959-July, 1960) are available immediately; Nos. 12-14 (August-October) will be available about October 15, 1960.

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"No one has ever criticized Bigelow's work."

WE'RE "OIL-FIRED-UP"

ABOUT THE NEW FM KILN!

Oil-fired up . . . **all** fired up . . . no matter how you say it, we're all excited about our unique new kiln* . . . the only **oil-fired** kiln of its kind in the United States, and another big step in our continuing effort to give you top performance from every FM Grinding Wheel and Segment.

Designed for us by Bickley Furnaces, Inc., in cooperation with our own engineers, and tested and proved in our plant, the new FM kiln gives us **exact** control of temperature and heat transfer during the entire firing cycle . . . gives **you** quality you can count on for every precision or rough grinding job. What's more, this exclusive process cuts the firing cycle for vitrified products by 20% . . . helps maintain the short delivery schedules you're accustomed to from Fuller Merriam.

Yes, we're oil-fired up to give you top quality in wheels and segments!

So if fast, precision grinding, uniform high quality, and short delivery figure in your cost and profit picture, contact your FM supplier today! Or send us your grinding application requirements.

*Bickley Car Bell Kiln with Diffusion-Aire Firing
Manufactured by Bickley Furnaces, Inc., Philadelphia

THE FM

FREE GRINDING WHEEL SELECTOR ON REQUEST!

FULLER MERRIAM CO. 72 Water St. West Haven, Conn. Telephone WEst 3-2501

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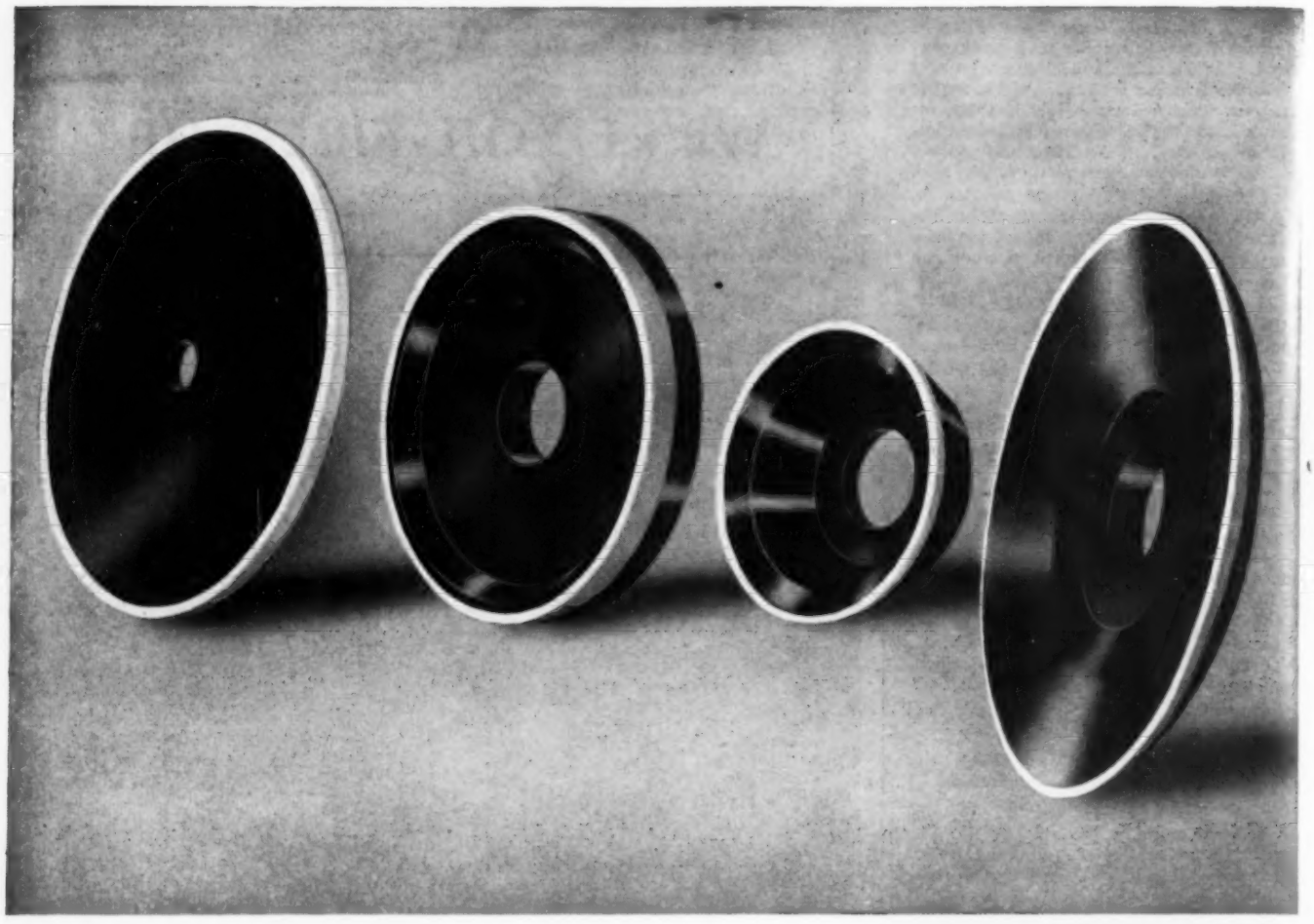

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Cut Cool and Free—Last Longer

Manhattan Diamond Wheels are engineered to give you faster, cooler cutting and longer life.

Advancements in Diamond Wheel construction and NEW RESINOID BOND developments fully utilize the advantages of both man-made and natural diamond insuring top performance from all Manhattan Diamond Wheels.

TRY Manhattan Diamond Wheels on your toughest application—find out for yourself how they perform in your plant—under your conditions—on your operation.

- New Bonds
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MANHATTAN RUBBER DIVISION—PASSAIC, N.J.

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OCTOBER, 1960

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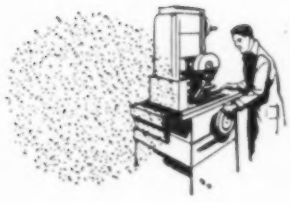
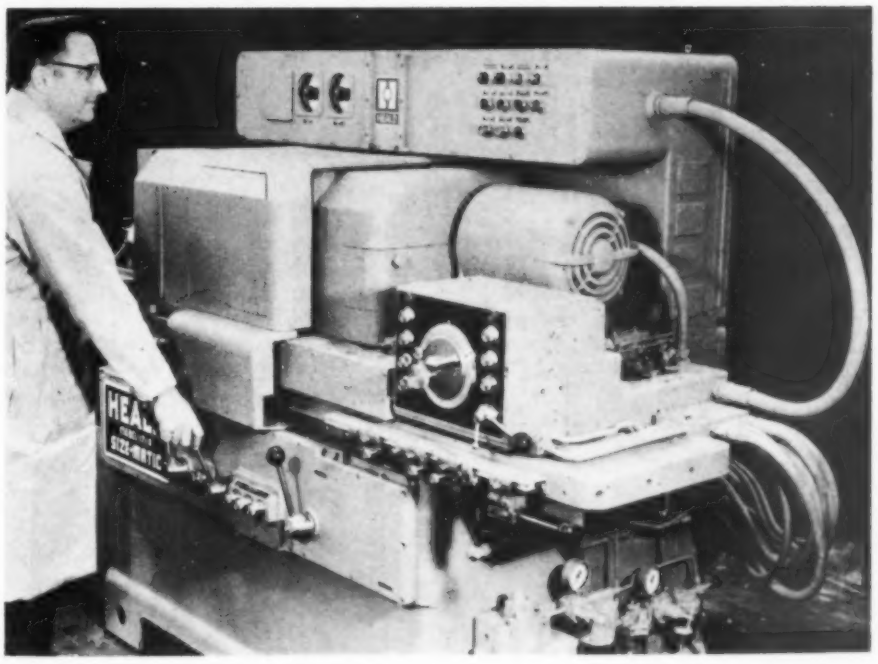


Equipment and Materials

New Internal Grinder Features Increased Workhandling Capacity, Better Feed Control, New Wheelhead Mounting

Impulse feeding makes possible straighter bores with smoother finishes for long bore ratios on Heald's new model 171A internal grinder. The machine also offers increased work-handling capacity and the ability to take heavier roughing cuts. For the production engineer, these features translate into higher rates of metal removal and reduced unit costs.



The wheelhead on the new 171A is mounted directly on the cross-slide and fed into the work. This contrasts with previous Model 1 designs where the workhead was mounted on a cross-slide and fed into the grinding wheel. The new arrangement permits heavier roughing cuts with a minimum of distortion, more accurate and faster feeding, and improved tolerance control.

Workpieces to 8" O.D. (10" O.D. in special cases) can be accommodated in the 171A. The new machine also has greater angular capacity, taking work with a 90 degree included angle. Previous models handled up to 60 degrees of included angle.

Either constant or impulse feeding can be selected through the feed box. For long bore ratios, impulse feeding (wheelhead advances only at reversals of the table) provides straighter holes and smoother finishes. Manual override permits operator to fast-feed or retract the wheelhead.

Infinitely variable compensation for wheel wear (from 0 to 0.004") aids in maintaining tolerances and promotes longer wheel life. Accuracy is also improved by locating heat-producing hydraulic equipment outside of the machine base to prevent thermal distortion.

Carefully engineered for minimum maintenance, the 171A is also easier to operate. Miniature D.C. solenoid valves speed-up cycles. Core plates and hydraulic mechanisms are more accessible for easier service inspection. For operator convenience, the feed box and wheel dresser adjustment knob are located at the front of the machine.

The Heald 171A internal grinder is available in Size-Matic, Gage-Matic or plain models.

The Heald Machine Company, 15 New Bond St., Worcester 6, Mass.

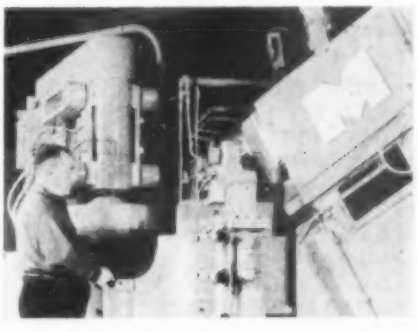
Use postpaid card. Circle No. 41

Packaged Grinding Heads Eliminate Column Ways

Self-contained surface grinding heads by Mattison, with rocker-arm suspension, may be mounted individually or arranged in groups to grind surfaces at any angle or in any plane. A unique toggle arm action forms a parallelogram design as it feeds a grinding wheel to the work surface.

Because column ways are eliminated, the packaged grinding heads are freed from maintenance problems caused by grit, chips, and lubrication. Completely sealed rocker arm journals have preloaded, tapered roller bearings which help the wheel produce fine finishes by eliminating play common in conventional tool slides.

Two basic parallelogram models—precision and foundry—are used for



finish and rough grinding respectively. Precision models incorporate an hydraulic feed which works against adjustable lead screw stops. The hydraulic feed is arranged for both rapid approach and fine feed strokes, with controllable feed rates and adjustable limits. Two-way rapid traverse of the lead screw and a variable increment jog infeed make the head ideally suited for automatic cycling and size control systems. Precision limit switches are included for control and interlock.

Foundry models feature variable grinding wheel pressure to 3000 lb, enabling the head to withdraw from the lead screw stop under excessive grinding loads without damage to wheel or spindle. A remotely operated variable increment feed also is provided for fine wheel setting and wheel wear compensation. Motor sizes range from 5 to 125 hp.

Mattison Machine Works, 545 Blackhawk Park Avenue, Rockford, Illinois.

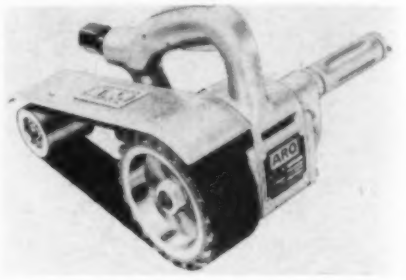
Use postpaid card. Circle No. 42

Grinder Merges Backstand Idler Principle with Portability

The latest addition to the air tool line of the Industrial Division, Aro Equipment Corporation, is a new type of portable abrasive belt grinder.

Said to provide faster grinding and finishing of metal than possible with any other portable power tool, the new Aro portable belt grinder combines the backstand idler principle of abrasive grinding with power and portability for greater flexibility and efficiency in grinding and finishing operations than heretofore possible with backstand idler installations.

Aro reports that this new tool will grind and finish in one operation, because the abrasive belt method leaves a smooth, straight line finish, with no gouges or swirls left in the work to require further finishing operations.



Belt speed is 7,000 sfpm. The tool is powered by a 2 hp air motor. Hardness and width of the contact wheel are optional.

Width may be either 1" or 2", without spacers or adaptors, permitting use of 1" or 2" belts. Medium, hard, or extra hard contact wheels are available, progressing in that order from the grind and polish wheel to the hardest for aggressive stock removal.

Aro Equipment Corporation, Industrial Division, Bryan, Ohio.

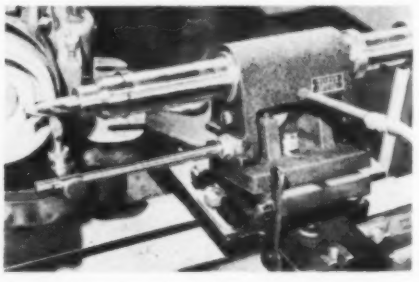
Use postpaid card. Circle No. 43

End-Mill Sharpening Fixture Includes Air-Bearing Spindle

A recently-announced end-mill sharpening fixture has the precision spindle supported by an air bearing to minimize friction. The arrangement is said to speed up the tool-sharpening operation, and to let the operator "feel" the grinding action.

This Weldon fixture mounts directly on the table of any make tool grinder.

The air-bearing-mounted spindle accommodates straight-shank end mills



from 3/16 in. through 1¼ in. diameter by means of a matched bushing set. Weldon also supplies bushing adapters to fit shanks with B & S, Morse, Jarno, and cam-lock tapers.

Air from shop supply from 60 to 90 psi floats the spindle in its precision sleeve. Positive air pressure prevents the entry of grinding dust which might mar or score the spindle bore. The Weldon air-spindle unit never needs lubrication.

The Weldon Tool Company, 3000 Woodhill Road, Cleveland 4, Ohio.

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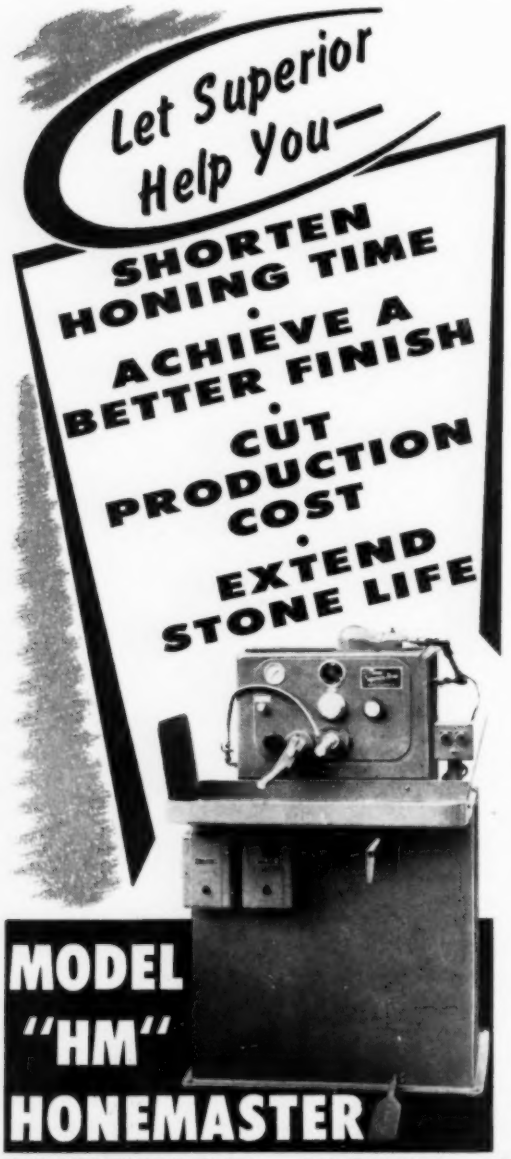
(Continued on page 55)



Adjustable hydraulic system assures constant stone pressure, continuous cutting with no fall off due to wear or stock removal.

Infinitely variable speed (250 to 1150 rpm.).

Single control dial shows when first piece is coming to finish size. Set, then thereafter just compensate for stone wear.

Hydraulic clutch and brake.

Stocked in all principal cities. Send for details and prices.

SUPERIOR HONE CORPORATION
1637 ELRENO STREET • ELKHART, INDIANA

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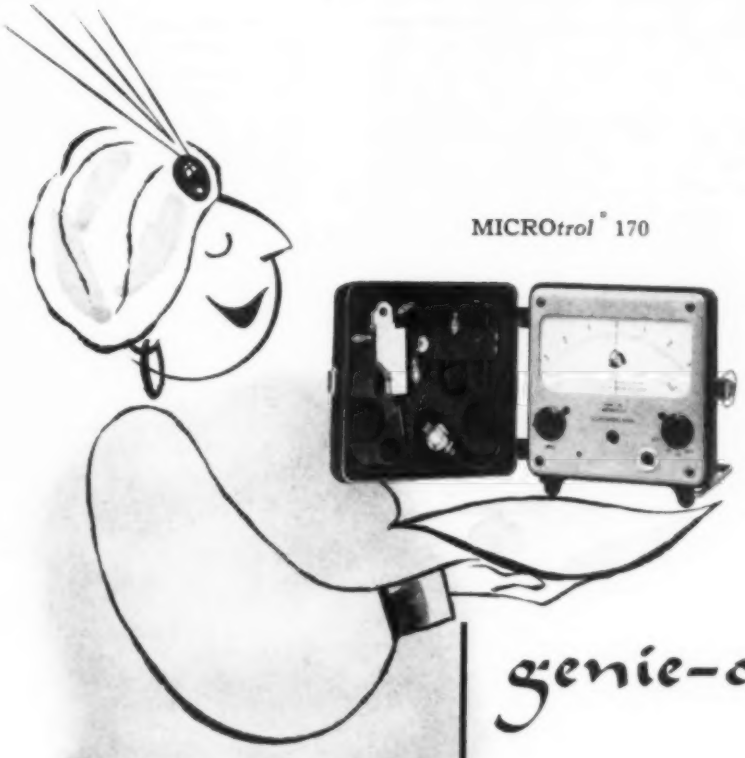
MICROtrol® 170



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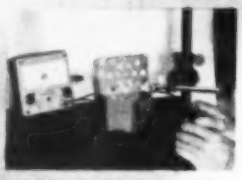

INDICATOR GAGE HEAD used with standard height gage-stand for surface plate work.

MINIATURE GAGE HEAD used with snap gage for production line inspection.

FRICTIONLESS GAGE HEAD used with comparator stand to check production parts.

Here is a measuring "Man Friday" with a hundred different uses... at the machine, in production, in the inspection department or the gage laboratory. This transistorized unit will do just about any gaging job ... quickly and accurately.

Equipped with battery or AC powered amplifier and four types of gage heads, MICRO*trol* 170 can be used with production comparators, height gages, snap gages, ID or OD gages and similar bench inspection devices. Entire unit weighs only 3 lbs.

FEATURES

- *Only 2 control knobs*
- *One adjustment zeros both scales*
- *Large meter with 4.6" scale*
- *Dual range ±.0003" to ±.003" or ±.001" to ±.010"*
- *Pocket-sized—5¾" square by 3 1/16"*
- *Mounting adapters and gage head stored in cover*
- *Carrying case handle doubles as amplifier stand*
- *Lightweight—weighs only 3 lbs.*
- *Battery powered—can be used anywhere*
- *AA dry cells can be used in emergency*
- *AC powered unit available.*

Basic Gages start at $341.00

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Contact your nearest Cutler-Hammer office for the name of your authorized distributor.

AIRBORNE INSTRUMENTS LABORATORY

DEER PARK, LONG ISLAND, NEW YORK

A DIVISION OF CUTLER-HAMMER INC.

Use postpaid card. Circle No. 233

NEW EQUIPMENT *continued*

Cutting Fluid Eliminates Many Difficulties of Heavy Grinding

A new cutting fluid developed by The Master Chemical Corporation is said to eliminate many of the difficulties peculiar to heavy grinding and machining operations. It has been field tested for the past fourteen months, and is now being marketed.

TRIM H. D., the new coolant, is a white jell which is diluted with water. It is claimed to do some of the toughest jobs on alloys, stainless, and cast iron, but will not stain brass and aluminum.

The Master Chemical Corporation, 13 North Huron Street, Toledo 1, Ohio.

Use postpaid card. Circle No. 45

Side-Etched Gage Blocks Reduce Errors, Aid in Identification

Sizes of DoAll rectangular gage blocks .050" and larger are now etched on the side and clearly visible while stacked. This improvement applies to both the standard type and the new stainless steel blocks.

Boxes for these new blocks have been designed to take full advantage of the side-etching feature. Now sizes are easily visible, whether the blocks are in the box or removed.

Side etching facilitates the use of gage blocks in many ways. No longer is it necessary to disassemble a stacked combination in order to recheck the block sizes. Individual block dimensions can be seen at all times and the total dimension of the combination is easily determined.

This is particularly useful when using go and no-go stacks of blocks. With side etching the problem in identifying the stacks is eliminated.

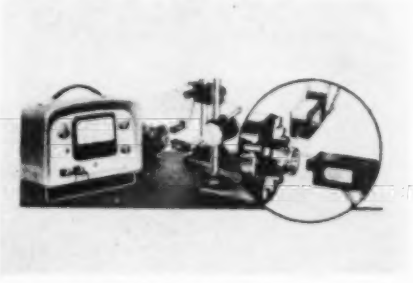
The DoAll Company, 245 North Laurel Avenue, Des Plaines, Illinois.

Use postpaid card. Circle No. 46

Differential Gaging Gives Millionths Accuracy Without Precision Fixturing

A new approach to high precision measurements using simple electronic type gaging equipment eliminates the need for expensive, short lived mechanical fixturing.

With Cleveland differential gaging techniques, a wide range of measurements is now possible covering such areas as; concentricity, roundness, size, diameter, taper, flatness, profile, cam contour, parallelism, squareness, lead screw pitch, wall thickness and others. Typical applications include measurement of the true roundness of journals



on parts weighing up to four tons while in the production machine, and concentricity of I.D. and O.D. of small bearings using non-precision spindles.

The basic equipment required consists of two identical gage heads and a differential input amplifier. The principle of operation is that of cancellation of the fixturing or environmental errors affecting the measurement so that only the desired dimension is indicated on the meter. These errors can be 100 times greater than the accuracy of measurement desired.

Cleveland Instrument Co., 6220 E. Schaaf Rd., Cleveland 31, Ohio.

Use postpaid card. Circle No. 47

Case Report Shows Savings for Electrically-Aided Grinder

In a recent case study, an electrically assisted grinder made by Wendt-Sonis Corporation of Hannibal, Missouri made an approximate saving of $15,000 a year over work performed on a conventional grinder.

The savings were made by a large manufacturer of automobiles and were reported as follows:

"The electrically assisted Wendt-Sonis 'Econogrind' unit removes .040"

Val Koller tells why he continually adds more Moore Jig Borers and Jig Grinders to his team

This is another in a series featuring the views of owners of leading tool and die companies.

by **VAL KOLLER**
President
Koller Die & Tool Co.,
Milwaukee, Wisconsin
Manufacturer of Dies and Metal Stampings—Tools—Jigs—Fixtures and Gages—Special Machines.

Moore equipment in Koller plant, with new #3 Jig Grinder in foreground.

"Since our foundation in 1919 it has been my personal objective to strive for perfection. Since that time perfection has evolved into a .000010" word for tool and die makers. Such precision is rapidly becoming common-place...particularly in electronics and guided missile fields of production. With the installation of Moore equipment in 1950, we have been able to compete successfully in a caliber of work that before was not possible.

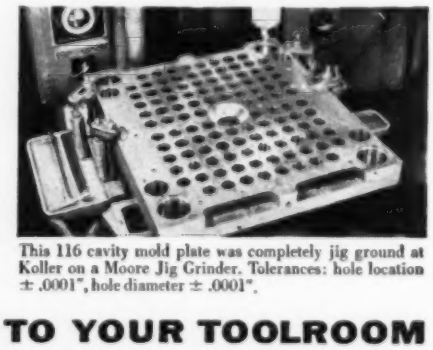
"Since that initial investment in a Moore Jig Grinder we have continually added Moore teammates to our toolroom. Today we operate more Moore equipment than any other top contract shop in the greater Milwaukee area.

"The tolerances and intricate contours now required make Moore Jig Borers and Jig Grinders a must in each toolroom. These machines operate at full capacity each workday with negative downtime due to mechanical failures. In fact, we have found that it costs real dollars and cents to operate *without* Moore equipment.

"This cost factor is just one of many reasons why we recently added another teammate to our toolroom ...the new Moore Model #3 Jig Grinder. This machine, with its tenth-splitting accuracy, hardened ways and wider range, enables us to service more customers better."

Write today for literature describing the unique features of #3 Moore Jig Borers and Jig Grinders or see our catalog in SWEET'S MACHINE TOOL FILE.

MOORE SPECIAL TOOL COMPANY, INC.
725 Union Avenue, Bridgeport, Connecticut



This 116 cavity mold plate was completely jig ground at Koller on a Moore Jig Grinder. Tolerances: hole location ± .0001", hole diameter ± .0001".

HOLES, CONTOURS AND SURFACES, tells how to produce tools and dies the modern way. 424 pages, 495 illustrations. $5 in U.S.A. $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS PRECISION ROTARY TABLES HOLE LOCATION ACCESSORIES

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of 8" x ½" x ¼" TC-2 carbide in four minutes, while conventional surface grinder with green-grit wheel will remove .050" of TC-2 Carbide from 2 blades in 40 minutes. The profilometer readings (RMS) for the Econogrind and conventional machines are 7 and 12 respectively."

This method has resulted in the savings of 2 diamond wheels per month at $316.00 each. With time and personnel savings the difference amounts to $7,000.00 on a total of approximately $15,000.00 per year."

Wendt-Sonis Corporation, Tenth and Collier Sts., Hannibal, Missouri.

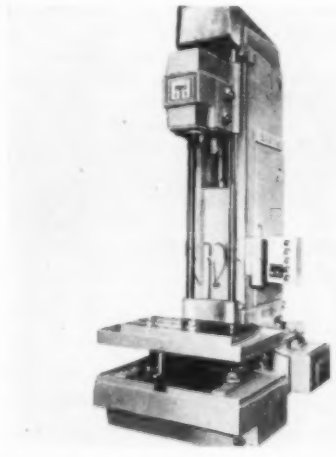
Use postpaid card. Circle No. 48

Compact Vertical Machine Hones Large Diameter Bores

The newly-designed Barnes Drill Model 3010 honing machine is available with 25", 35", 45", or 60" spindle travel.

The machine will hone bores up to 10" in diameter at maximum stroke, and it will hone larger diameter bores in shorter lengths.

Since no auxiliary electric panels are used, floor space is reduced and external conduit is kept to a minimum. All electric controls are built into the two side panels of the machine.



Shoulder height operating controls are removed from the area of coolant splash, and setup controls are protected by lock and key to avoid undesirable tampering after the setup has been made.

A separate 10 hp motor powers the hydraulic reciprocation. To reduce maintenance problems, the hydraulic

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We manufacture a complete line of industrial-

DIAMOND PRODUCTS

In Industrial Diamond products you have to rely on the integrity of the supplier more than in any other line, since the diamonds are either imbedded in the tools or the bond. We guarantee our wheels to contain 72 cts. of diamond powder per cu. inch.

Write for our detailed CATALOG

THE DIAMOND WHEEL WITH THE HEART IN IT

General Industrial Diamond Co., Inc.
360 Glenwood Ave., East Orange, N. J.
Telephone: Orange 4-7322-3-4

Use postpaid card. Circle No. 235

unit is located in the open at the back of the machine. The hydraulic controls and the coolant pump are also in the open at the lower right side of the machine.

To change spindle speeds, the operator simply turns the two knobs on the right side of the head.

This machine can short stroke at any point in the bore, and it is available with a dwell mechanism. A wide variety of fixtures and tables can be adapted to meet individual production requirements.

Barnes Drill Co., 886 Chestnut Street, Rockford, Illinois.

Use postpaid card. Circle No. 49

Compact Unit Achieves Counter-Balance Without Weights

A wide range of wheel pressure positions and complete buffing and polishing head counter-balance without the use of weights is now available on all standard Murray-Way buffing and polishing heads by use of a compact, simple torsion balancing unit.

This new unit is especially advantageous when "side" or "up" pressure must be exerted on the work. Consisting of a heavy coil spring, enclosed in a cast iron housing, it may be quickly and easily adjusted with a regular shop wrench to any of a wide variety of wheel pressures, from a few ounces to over 100 pounds.

Once adjusted, this compact unit stays in adjustment. Casual tampering is impossible. The work area remains open and uncluttered. Hanging weights, formerly a necessary nuisance, are eliminated.

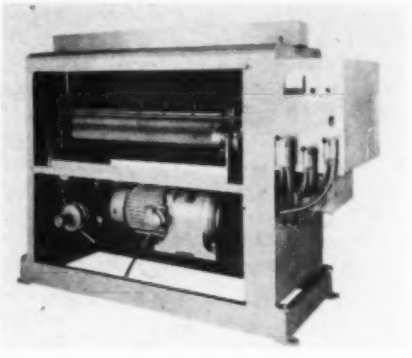
Murray-Way Corporation, P. O. Box 180, Birmingham, Michigan.

Use postpaid card. Circle No. 50

Abrasive Nylon on Oscillating Arbor Gives Flexible Surfacing

A new oscillating sheet surfacer employs abrasive-impregnated nylon mounted on an oscillating arbor to perform a variety of surfacing operations on sheet materials.

The arbor is adjustable to oscillate from 0 to 400 times per minute. The workhead drive can be equipped for single or variable speed, and the feed rolls are equipped with variable speed drive. Work pressure is positively controlled.



The work may be supported by various types of billy rolls, or by a powered conveyor. The machine may be used singly or incorporated into a conveyor line.

The unit is available with workheads from 48" up and with multiple heads on the same conveyor, can be furnished for either dry or wet operation.

Sales Service Mfg. Co., 2363 University Avenue, St. Paul 14, Minnesota.

Use postpaid card. Circle No. 51

New Quality Control Method Grades Large Grinding Wheels

Space Age electrodynamic vibration testing equipment has been adapted to the far more prosaic but nonetheless necessary task of production grading large grinding wheels. The technique, developed by MB Electronics, a pioneer in the field of vibration testing, offers a faster, simpler and more accurate quality control tool for abrasive manufacturers.

BREAK THE "PROFIT SQUEEZE" WITH BRIGHTBOY

New slants to save your time, cut your costs, improve your product quality

A NEW APPROACH TO BIGGER TIME SAVINGS

The unique, cost-saving action of multi-use Brightboy (abrasive and rubber, functioning simultaneously) produces a finish that often constitutes the final polish:

BURRING • CLEANING
FINISHING • POLISHING
frequently in one operation

THE REVOLUTIONARY NEW CONCEPT OF ABRASIVE APPLICATIONS
For working all metals, wood, glass, laminated materials, some plastics.

49 readily available Brightboy STOCK textures are JOB-MATCHED to your machine and manual operations for conventional and automation production. Aluminum Oxide and Silicon Carbide abrasive grains—grades extra fine to extra coarse—in soft, semi-firm, firm and tough rubber binders. *The only complete, comprehensive stock line of soft rubber abrasives.* In wheels, sticks, rods and blocks for machine and manual operations.

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
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America's Pioneer Manufacturer of Rubber-Bonded Abrasives

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RUBBER CUSHIONED ABRASIVES

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NEW & ADDITIONAL APPLICATIONS FOR ABRASIVES

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- ★ Machine speeds
- ★ Job-matched grains and textures
- ★ New, revised wheel sizes
- ★ Center hole specifications conforming to American Standard regulations

WRITE TODAY FOR YOUR COPY

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The resonant frequency of a large grinding wheel is an important indicator of its density and quality, and especially its freedom from internal voids and cracks. Previously, this was determined by manual excitation of the wheel—tapping it with a mallet. The noise signal was fed into a microphone pick-up, amplified, and then presented on a cathode ray oscilloscope.

Through visual comparison with a known reference signal, the wheel's resonant frequency was determined by an analysis of the familiar Lissajous figures. In addition, a thin layer of refractory sand was sprinkled on top of the wheel under test. At the wheel's resonant frequency, the sand displaced itself and settled at the nodes—producing a four-point "star."

A new approach uses an MB C31 vibration exciter, driven by an MB amplifier with variable frequency sine wave input. Weight of the abrasive wheel under test is carried mainly by two metal standards, from which the wheel is isolated by four three-layer sections of Isomode pad. This provides 90 per cent isolation of the wheel and reduces electrodynamic excitation requirements.

By scanning oscillator frequency, the operator notes at which frequency the four-point sand pattern forms. The forced vibration of the exciter, which corresponds to the natural or resonant frequency of the wheel, then can be read directly from the oscillator dial. By coupling a frequency counter to the system, even greater accuracy can be obtained.

MB Electronics, Division of Textron Electronics, Inc., 781 Whalley Avenue, New Haven 8, Connnecticut.

Use postpaid card. Circle No. 52

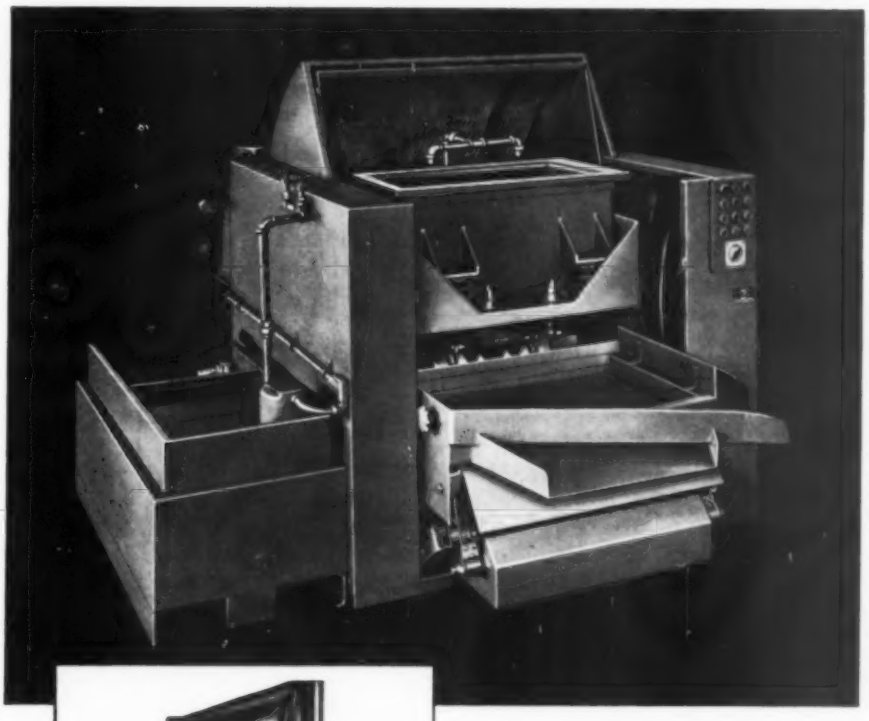
New Deburring Compound Speeds Barrel Cut-Down

A new compound that combines moderate alkalinity with abrasives to deburr metals in tumbling barrels has been introduced by Oakite Products, Inc.

The new compound, Oakite FM 182, incorporates 40- to 80-mesh abrasive to speed cutting action, and so shorten deburring cycles in the finishing operation. It has no adverse chemical action on metals, and in fact, often enhances

announcing the NEW

*Recirculating VIBRATRON



Processed in *Recirculating* Vibratron. Gleaming! Clean!

Processed in conventional vibratory machine. Notice abrasive impregnation.

See the difference Recirculation makes!

This new idea in vibratory finishing pays off in increased production and operating economy. Wastes are removed constantly during the processing cycle, *eliminating* abrasive impregnation! Compound stays clean.

Parts may be deburred, radiused, and cleaned *in one operation*. No separate cleaning cycle needed! Equally important . . . compound can be used for its effective life, lasts up to 48 hours.

The result? The unretouched parts photo tells the story. Both were vibratory finished the same time in the same media. The top in a recirculating Vibratron. The bottom in a conventional vibratory machine.

Want to know more? Your inquiry will receive prompt attention. Let's hear from you. Today?

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**U.S. and foreign patents applied for.*

FOREIGN REPRESENTATIVES: ARGENTINA-Roto-Finish Argentina-Buenos Aires • AUSTRALIA-A. Flavell Ltd.-Cheltenham • BRAZIL-Refema-Roto-Finish-Sao Paulo • CANADA-Canadian Hanson & Van Winkle Co., Ltd.-Toronto • ENGLAND-Roto-Finish Ltd.-Hemel Hempstead • FRANCE-Societe Roto-Finish-Paris • GERMANY, AUSTRIA, FINLAND, NORWAY, SWEDEN, SWITZERLAND, YUGOSLAVIA, JAPAN-Metallgesellschaft A.G.-Frankfurt, a.m.-Germany • HOLLAND, BELGIUM, LUXEMBURG-N.V. Roto-Finish Maatschappij-Delft, Holland • ITALY-Societa Roto-Finish a R.L.-Milan • MEXICO-Enthone de Mexico, S.A. Prol Pino 669, Mexico 15, D.F. • SPAIN-Instituto Electroquimico, S.A.-Barcelona

Use postpaid card. Circle No. 237

the color of the pieces. It may be used in a range of 4 to 48 ounces per gallon of water, at room temperature, and for times varying with the nature of the work.

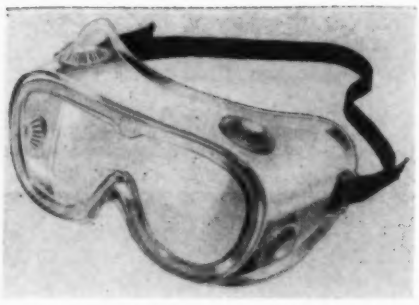
Oakite FM 182, the latest addition to Oakite's family of deburring compounds, is particularly recommended for severe cutting down operations.

Oakite Products, Inc., 157 Rector Street, New York 6, N.Y.

Use postpaid card. Circle No. 53

Flexible Frame Safety Goggle Meets Dust, Splash Conditions

The soft, flexible frame of these goggles cushion-fits to the face. All-plastic vents eliminate corrosion and electrical contact problems and provide



better ventilation and visibility. Goggles are available in clear or green frames, with clear or green single lens.

Welsh Manufacturing Co., 24 Magnolia Street, Providence, Rhode Island.

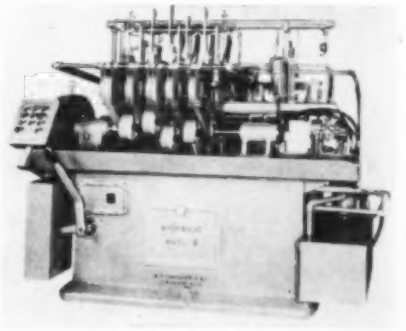
Use postpaid card. Circle No. 54

Machines Lap Shafts 84" Long

Footburt-Schraner shaft lapping machines now come in a complete range of models for lapping any size shafts, including crankshafts, up to 84" long.

Coated abrasive cloth is used to provide a 4 to 7 microinch finish. The machines are said to be able to lap bearing surfaces and fillets in one operation. Output for crankshafts is rated at up to 60 pieces per hour; for other shafts as up to 150 per hour.

Abrasive cloth in rolls is mounted on the lapping arms. At each cycle the roll is automatically advanced to provide fresh cloth for each new part.



Lapping is done under a flood of coolant to keep the cloth open and to flush away spent abrasive. A spindle assembly combining rotary and axial motion oscillates the shafts as they rotate against the lapping heads.

Machines come with any required number of heads, and in three models, all adjustable. Model A takes shafts to 24" in length; Model B, to 40"; and Model HD, to 84".

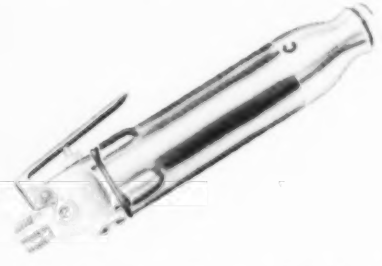
The Foote-Burt Company, 13000 St. Clair Avenue, Cleveland 8, Ohio.

Use postpaid card. Circle No. 55

Pneumatic Grinder Weighs 15 Oz., Develops 50,000 RPM

The Model 60 Cyclone pneumatic grinder is 6½" long and weighs only 15 ounces. It is said to operate best at 50,000 rpm with mounted grinding wheels.

The spindle accommodates mandrels ¼" in diameter. A collet ¼" O. D., ⅛" or 3/16" I. D., is available for use in the spindle.



An adjusting screw controls the valve that regulates the speed of the spindle for varying air pressures.

M-B Products, Inc., 46 Victor Avenue, Detroit 3, Michigan.

Use postpaid card. Circle No. 56

New Components Round Out Toolroom Accessory Line

The Universal Engineering Company has recently added several hundred items to its growing stock of jig and fixture components and clamp assemblies. This brings to more than a

NOW another Hammond

Hammond Dial Control Does It!

Advantages

. . . Select proper wheel speed while head is running

. . . Various speed ranges available

1 — **WHEEL ECONOMY:** As wheels wear speed is increased, giving maximum production and wheel life.

2 — **INCREASED PRODUCTION:** Select most efficient speed without stopping head.

3 — **BETTER FINISH:** Different materials require different speeds.

4 — **CONVENIENCE:** Metal chart on dial is your guide to the right speed for the job.

Write today for complete information!

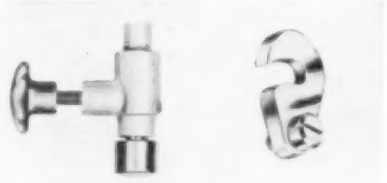
Hammond Machinery Builders INC.

1651 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

Use postpaid card. Circle No. 238

thousand the varied toolroom accessories manufactured in regular and stainless steel by Universal Engineering Co.

The new clamp assemblies, fixture details, spring plungers, torque screws and chuck jaw blanks now being produced are designed to complement Universal's standard line of drill bushings,



collet chucks, floating, boring and oil coolant chucks, boring bars and the famous "Kwik-Switch" production tools.

The Universal Engineering Company, Frankenmuth, Michigan.

Use postpaid card. Circle No. 57

Resin Diamond Wheel Offers Cool Dry Grinding

A new resin bonded diamond wheel, designated the Forty-Niner by its maker, A. I. T. Diamond Tool Company, is said to offer finer finishes due to its cool grinding under dry conditions, and to excel in either wet or dry grinding. Longer life and a body that resists expansion are other merits claimed.

Wheels are available in 50, 75, or 100 concentration, in grit sizes desired by the user. The Forty-Niner, it is said, will improve finish now being produced by a regular diamond wheel with like grit size.

The new wheels are being demonstrated in A. I. T.'s "Dia-Mo-Rama" Room.

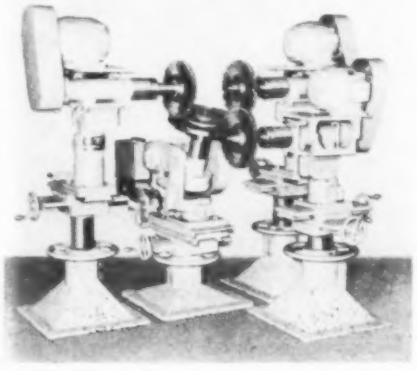
A. I. T. Diamond Tool Company, 8221 North Kimball Avenue, Skokie, Illinois.

Use postpaid card. Circle No. 58

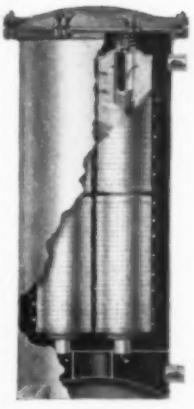
Semi-Automatic Deburring Unit Finishes Circular Shapes

A new Acme deburring machine is said to be ideal for such applications as finishing gears and sprockets, stators, and a wide assortment of stampings.

Basically, the machine consists of an adjustable single spindle Acme type B-61 semi-automatic machine to position and rotate the parts, and Acme



For SUPER Finishes you need SUPER Filtration...



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Furnished in capacities from 0.1 to 750 gpm. Various cartridges available for mineral and inhibited detergent oils.

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For complete oil reclaiming. Removes solids, acids and volatile impurities; moisture, solvents, gases, etc. from hydraulic fluids by heat-vacuum process.

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HILCO HYDRAULIC OIL FILTERS

You get complete maintenance of all hydraulic fluids. That means increased production, reduced maintenance cost, reduced oil cost and continuous equipment protection. Only HILCO offers such a wide range of filters and systems engineered for your needs.

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HILCO CUTS COSTS BECAUSE IT ELIMINATES...

- √ VARNISH AND SLUDGE DEPOSITS
- √ FLUSHING AND MANUAL CLEANING
- √ FREQUENT OIL CHANGES
- √ ACCUMULATION OF DIRT

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890 YONGE STREET, TORONTO 8760 VERVILLE STREET, MONTREAL

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L-8-L adjustable lathes positioned around the machine to perform the deburring operations.

Each of the lathes in the picture is equipped with manual adjustments to raise or lower, or to provide "in" and "out" positioning of the deburring heads.

The lathes are driven by a 5 or 7½ hp motor through a belt-and-pulley arrangement. Pulley diameter or motor rpm can be changed to increase or decrease spindle speed from 1000 to 2100 rpm. Abrasive wheels, abrasive disks, wire brushes, or tampico brushes can be mounted on the lathes.

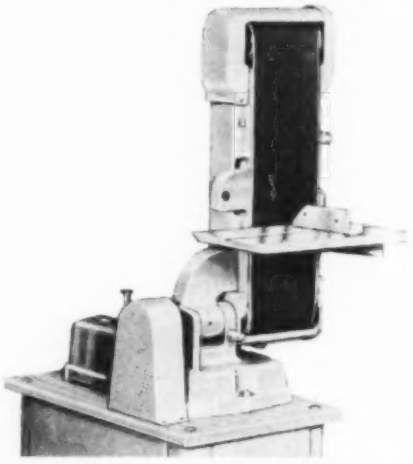
Acme Manufacturing Co., 1400 East Nine Mile Road, Detroit 20, Michigan.

Use postpaid card. Circle No. 59

Belt Sander Designed for Utility, Low Cost

Newest in a series of Duro power tools designed, according to the manufacturer, for maximum operating utility and efficiency at low cost is a 6" belt sander for either vertical, horizontal, or intermediate operation. The hinged door on the idler drum can be opened for slack-of-belt sanding or deburring on curved objects.

Special features listed by the maker include preloaded tensioner for quick belt changes; simplified one-knob tracking with setting lock; and heavy



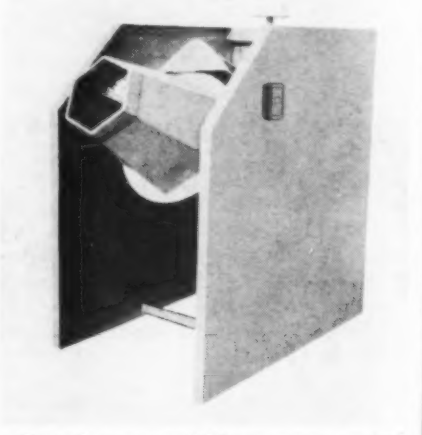
cast iron construction. Available accessories are a fully adjustable fence and a dust collector which is driven by the sander motor.

Duro Metal Products Company, 2651 North Kildare Avenue, Chicago, Ill.

Use postpaid card. Circle No. 60

Tilting Barrel Finisher Speeds Handling Operations

The Model TC-1V precision barrel finisher is a versatile, small-capacity machine with wide applications. It offers high precision results by combining an easy-tilting barrel with 19 to 44 rpm variable or fixed speed drive. The 1.1 cu. ft. capacity is ideal for small lots, pilot operations, or many special finishing jobs.



Barrels are available in open conical or closed hexagonal types, one or two compartments. All barrels measure 17" across and are orange vinyl plastic lined by an exclusive Rampe process.

Standard controls include ¼ hp 110 volt motor, start-stop push-button, rugged welded construction throughout.

Model TC-1V takes only 41" x 27" floor space and is 46" in height.

Rampe Manufacturing Co., 14915 Woodworth Ave., Cleveland 10, Ohio.

Use postpaid card. Circle No. 61

4 sweet solutions for faster grinding action

For 1¢ a gallon of coolant, you get the most open grinding wheel you'll ever see, with W&B Grinding Concentrate 1500 — unusually keen grinding action. White & Bagley's 1500 is a chemical type water soluble that mixes instantly with water. It forms a light-green, transparent, non-irritating solution that stays sweet and clear. Use it for exceptional accuracy, high production, on *steel and titanium.*

When you want keener grinding action on *steel, cast iron and nonferrous* metals, use W&B Grinding Concentrate E-55. It forms a light-green, transparent solution that retains clarity, — won't irritate skin — eliminates foul odors.

Both E-55 and 1500 (above) give you excellent rust protection, settle chips fast, leave parts and machines clean — they're the best chemical type concentrates you'll find.

To get superior results on *both grinding and cutting,* use W&B Lubricant 1888. This oil-type, water soluble concentrate with high-detergent action mixes easily with any water — forms a stable translucent emulsion that gives more support to wheels and cutting tools. You get smoother finishes, and closer tolerances with White & Bagley's 1888. It's non-irritating, free from offensive odors; keeps machines clean.

If you want to replace oil on tough grinding and cutting jobs, try W&B HD Soluble 2213. It's an all-purpose, extreme-pressure concentrate — fully miscible with water. Gives more support than other water solubles, plus excellent cooling. White & Bagley's 2213 in water produces better results than many cutting oils. It's nonirritating, resistant to odor formation.

To get a sweet solution for any grinding problem — write The White & Bagley Co., 88 Foster St., Worcester, Mass.

W-B INDUSTRIAL LUBRICANTS

THE WHITE & BAGLEY CO.

Worcester, Massachusetts • Detroit, Michigan

Originators of Grinding Lubricants

Use postpaid card. Circle No. 240

Lightweight Right-Angle Sander Uses 5" Discs

A new lightweight, compact right-angle sander with a speed of 9000 rpm especially made for standard 5" sanding disc or any 5" disc cut down from 7" or 9" sizes is announced by Doeden Tool Corporation.

Weighing only 2¼ pounds, this new Dotco Model 2AS9 is designed for one or two-handed operation to achieve

maximum production with minimum operator fatigue. The supporting handle is easily removable, further reducing the tool's weight.

The compact design of Dotco's Model 2AS9 permits its use in reaching inaccessible work areas since its over-all height from sanding surface to top of the tool is only 3½", while the length of the tool is only 6⅝". Even with a 5" diameter sanding pad on the tool, the over-all length is only 8¼".

Doeden Tool Corporation, Hicksville, Ohio.

Use postpaid card. Circle No. 62

Metal Cutting Abrasive Disc Line Offered in Unique Package

A line of aluminum oxide resin-bonded abrasive discs designed for metal cutting is a new offering of Chicago Wheel & Mfg. Co.

A pressurized 100-unit package of pliofilm keeps the discs dust-free and

prevents contamination, while 360° protection is provided by metal straps.

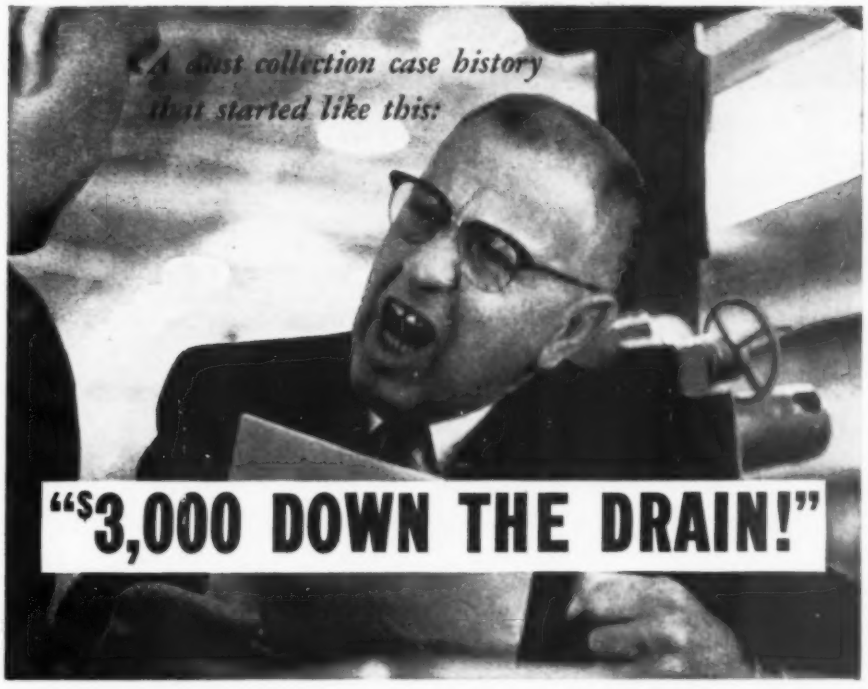
Discs are available in 7" and 9⅛" diameters and in five standard grit sizes: 24, 36, 50, 60, and 80 and finer.

Chicago Wheel & Mfg. Co., 1101 West Monroe Street, Chicago 7, Illinois.

Use postpaid card. Circle No. 63

Compound Decreases Maintenance In Cast Iron Machining

Deposits of cast iron chips on chucks and machines are said to be prevented with a new machining compound. It



"Get rid of that DUST!"

"The boss was sore and I was on the spot.

"He shoved the report from the efficiency engineer at me. I read it: 'Yearly loss due to machine wear, misalignment and down time . . . $3,000. Major cause . . . abrasive dust.'

"The boss pointed his finger at me, 'Get rid of that dust and get rid of it fast!' "

Now, it was my problem, and I was on the spot.

"First thing I did was to check into a central dust collecting system. But the lowest bid I could get was $8,000. Too much.

"Then I came across a Torit ad, offering economical portable dust collectors.

"Two days after my call Torit engineers showed me how in only one week they could install a portable, unitized Torit Dust Collector at each of our eight grinders, trapping dust right at its source—cleaning the air throughout the entire plant.

"Total cost? Only $2400.00. That's a $5,600.00 saving over the lowest priced central system.

"You guessed it—we installed the eight Torit Collectors."

Torit solved my problem

"This year when we received our report it read: 'Loss due to machine wear, misalignment and down time...$340.00.' A saving of $2,660.

"This time the boss was all smiles. He slapped me on the back, 'Charlie, you did a fine job getting rid of that dust. Frankly, I didn't think it could be done with such a small investment.'

"Now there's a pretty nice fellow to work for.

"If you've got a dust problem, or are about to have one, write the Torit people. They've manufactured and sold more dust collectors than anyone else in the U.S.A. Chances are they can help you the way they helped us."

TORIT manufacturing company

Dept. 511, 1133 Rankin St., St. Paul 16, Minn.

Use postpaid card. Circle No. 241

also stops rust of chips, parts and tooling. Maintenance of machines, tools and fixtures is thus reduced.

The new product, compound 588, makes a milky emulsion when dispensed in water.

Baker/Gubbins Company, 1448 Wabash Avenue, Detroit 16, Michigan.

Use postpaid card. Circle No. 64

Standard Abrasive Belt Grinders Modified for Specific Jobs

"Custom-built" standard abrasive belt grinders, engineered for specific applications, are offered on application by Grinding & Polishing Machinery Corporation.

The belt grinder pictured below is an example. This machine does a production job of grinding 30" longitudinal welds inside tanks as small as 6" I. D. The machine is operated by a 1½ hp motor at 3600 rpm, using a belt 1" x 120" at a speed of 5500 sfpm.

Grinding & Polishing Machinery Corporation, 2530 Winthrop Avenue, Indianapolis 5, Indiana.

Use postpaid card. Circle No. 65

All-Plastic Spectacle Provides Inexpensive Visitor Eye Safety

An inexpensive means of eye protection for visitors to industrial plants is now being produced in the form of a lightweight, all-plastic spectacle. Manufactured by American Optical Co., the device offers a wide area of coverage through a shield-like single lens which covers both eyes.

Lenses are available in either clear or green in a clear crystal frame. Each spectacle is packaged in an individual cellophane envelope. Cost is less than a quarter the price of the average safety spectacle.

American Optical Co., Southbridge, Mass.

Use postpaid card. Circle No. 66

New Bay State "Koolie Hat" Wheels Speed Weld Grinding

A new grinding wheel to speed weld grinding has just been introduced by Bay State Abrasive Products Company. Called the "Koolie Hat" wheel because of its shape, the new wheel is dish-shaped to permit holding the wheel at a lower angle to the work. The result is better control over the grinder.

The company claims the new shape reduces operator fatigue by eliminating jitter and bounce with resultant lowering of accidents. Uniform wear

of all three layers is assured and the wheel cannot wear thin due to its dished shape.

By providing a narrow, radial contact between wheel and work, wheel speeds remain high to insure fast removal of welding beads without excessive heat build-up.

"Koolie Hat" wheels are available in two diameters, 7 and 9 inch and are ¼ inch thick. Bay State distributors or direct representatives are ready to demonstrate the new wheel anywhere.

Bay State Abrasive Products Company, Westboro 2, Massachusetts.

Use postpaid card. Circle No. 67

Hydraulic Actuator Increases Plunge-Grind Output

A new Federal-Arnold actuator is an hydraulically operated device for automatic positioning and retraction of a continuous grinding gage. It increases both the output and quality of plunge-grind operations because it allows an operator to control two or more machines and makes it impossible for him to overlook using the gage on any workpiece.

The actuator, consisting of a ball-bearing mount and a support arm working in conjunction with a single

REISHAUER SWISS MADE

Thread and Worm Grinders

For Production or Tool Room Grinding Operations

The Type NRK UNIVERSAL Thread and Worm Grinder is designed for grinding with single or multi-thread wheels. This machine, with attachments, can be used for grinding and relief-grinding of external — right- and left-hand — single or multiple screw threads — to any desired profile.

Type NRK UNIVERSAL Thread and Worm Grinder

THE NRK GRINDS:

- Thread Gauges
- Taps — all kinds — straight or spiral flutes
- Thread Milling Cutters
- Trapezoidal Thread Spindles
- Thread Chaser Dies for self-opening die heads
- Gear and Worm Hobs
- Cylindrical Press Rollers
- Thread Rolling Dies up to 8" diameter
- Crushers for forming multi-rip grinding wheels
- Commercial Threads — plunge cut method — on all kinds of screws, studs, spindles, etc.
- Internal Threads up to 5" diameter
- Racks up to 18" long

CAPACITY AND SPEEDS

Admits work pieces between centers	28"
Maximum length of thread ground	17-½"
Minimum thread diameter	.120"
Maximum thread diameter	8"
Minimum pitch	60 t.p.i.
Maximum pitch	3"
Width of single thread grinding wheel	.32"
Widths of multi-thread grinding wheel	.8"-1.2"-1.6"
Speeds of grinding wheel	1550 or 1900 r.p.m.
Speeds of work spindle	1.6 to 80 r.p.m.

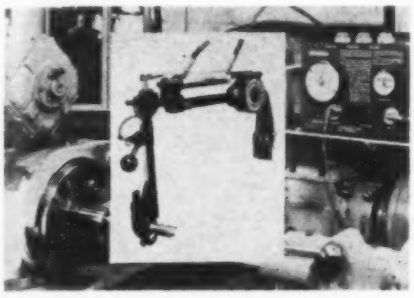
Write for further information

COSA — *Importers of Leading Precision Machine Tools*
Nationwide Sales and Service
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

In Canada contact Cosa Corporation of Canada, Ltd., 1160 Lakeshore Road, Long Branch, Toronto 14, Ontario

Use postpaid card. Circle No. 242

hydraulic cylinder and a cam-actuated rod, carries the caliper to a position in front of the workpiece. Then, through cam action, the caliper is brought into gaging position. At the end of the cycle, the action is reversed and the gage is returned to its rest position.



The actuator can be operated by the grinder hydraulic system directly or may be signalled in by external means at some other time of the cycle. Since it positions the gage automatically, the actuator eliminates the danger of the operator's being injured by accidentally contacting the moving part.

Federal Products Corporation, 1144 Eddy St., Providence 1, Rhode Island.

Use postpaid card. Circle No. 68

Honing Machine Developed for 2" and Smaller Diameter Bores

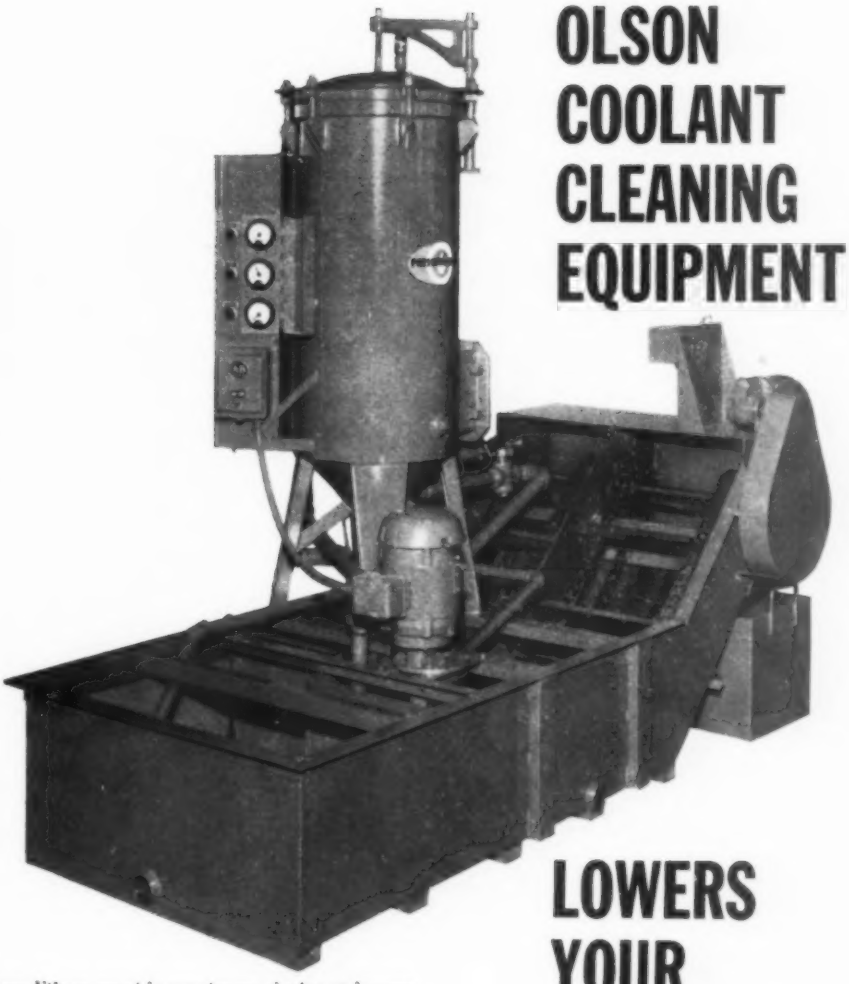
A recent development from Barnes Drill Co. is their Model 122 honing machine, equipped with a 12" stroke and a 12" swing, which hones bores up to 2" in diameter at maximum stroke.

The Plugmatic sizing mechanism maintains size consistency within .0002" from bore to bore on this honer. To keep floor space to a minimum, all electric controls are enclosed inside the machine column, and the coolant reservoir is an integral part of the base. The coolant pump and hydraulic controls are in the open at the sides

of the machine, and the hydraulic tank is in the open at the rear of the column.

Operating controls are mounted at shoulder height, and set-up controls are protected by a locked cover to avoid undesirable changes once the setup has been made.

A simplified electric hone expansion unit controls the infinite hone feed



OLSON COOLANT CLEANING EQUIPMENT

Olson Filters provide maximum clarity at lowest operating costs. Can be furnished for central systems or as individual units, automatic or manually operated.

LOWERS YOUR COST PER PART

By removing even minute particles (½ micron) of metal and abrasive contaminants, Olson Filters automatically deliver a continuous supply of visually clean coolant. This is especially important in precision grinding and finishing operations to produce low micro-inch finishes at a reasonable cost.

Olson-clean coolant prevents excessive loading of grinding wheels, eliminates too-frequent dressing, and guarantees greatly increased wheel life. More important, Olson will custom engineer a filtration system to meet *your* specific needs—automatic or manually operated, central system or for individual machines or operations. For complete information, mail the coupon today.

OLSON FILTRATION ENGINEERS *Division of The American Laundry Machinery Company, Cincinnati 12, Ohio*

OL-14G

Send complete information on Olson Coolant Cleaning Equipment.

*Name*_____

*Firm Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

OL-14G

Use postpaid card. Circle No. 243

adjustment. Rapid expansion, rapid collapse, and automatic compensation for stone wear also are electrically controlled. Infinitely variable speeds from 270 to 870 rpm are indicated on the plate on the right side of the column.

Barnes Drill Co., 886 Chestnut Street, Rockford, Illinois.

Use postpaid card. Circle No. 69

Tungsten Carbide Master Balls Find Many Shop, Toolroom Uses

Master balls made of tungsten carbide to ±.000010" size tolerance, .000010" sphericity and 1-microinch finish can be used for simplified checking of hole depth, ID's and internal tapers, setting and checking comparator gages, and many other applications in the shop, tool room and gage room.

Being tungsten carbide, the balls are extremely hard and extremely resistant to wear and impact. They do not pit or rust from handling or humidity, are dimensionally stable, and retain their high precision far longer than balls of other materials.

TUNGSTEN CARBIDE MASTER BALLS by INDUSTRIAL TECTONICS, INC.

These master balls are available from stock in sets or individually in 31 sizes, from 1/16" through 1" by 1/32" increments. Set No. 310 (illustrated) includes the complete range of sizes.

Other sets consist of 15 balls, 1/16" through ½" by 1/32" increments; 16 balls, 17/32" through 1" by 1/32" increments; and 16 balls, 1/16" through 1" by 1/16" increments. All sets are furnished in a sturdy Philippine mahogany case, with tweezers for handling the smaller balls.

Industrial Tectonics, Inc., Ball Division, 3686 Jackson Rd., Ann Arbor, Michigan.

Use postpaid card. Circle No. 70

Burnout-Proof Air Motor Powers New Belt Sander

Buckeye Tools Corporation is now marketing a portable belt sander equipped with a burnout-proof air motor for finishing flat surfaces under continuous duty conditions.

Known as the 61E-783A, the sander includes sheet metal, marble and granite, wood, plastic, and fiberglass among its applications. Chief advantage of the tool is its ability to withstand abnormal abuse without the danger of shock or motor burnout.

This model has a 1.5 hp governed air motor and delivers and maintains a belt speed of 1120 sfpm under load. It is 16" long, weighs 15 lbs., and drives a standard 3" x 24" belt.

Buckeye has also made available an air motor conversion kit for electric sanders of similar shape and size. The kit may be easily installed in existing tools.

Buckeye Tools Corp., 5003 Springboro Pike, Dayton 1, Ohio.

Use postpaid card. Circle No. 71

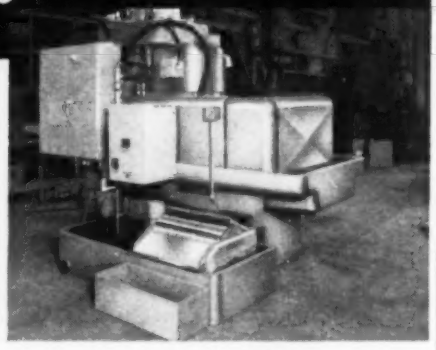
Drill Grinder Requires No Chucks, Collets to Hold Drills

Grinding 59° drills accurately with a free cutting conical form on all sizes from ⅛" to 2½" diameter can be done quickly and easily on the new Model "DF" Sterling Drill Grinder, according to the McDonough Manufacturing Company.

Because no chucks or collets are required to hold the drills it takes a minimum of time to change set-ups for various sizes. Locating the drill at the cutting edge of the lip being ground produces an accurately centered drill that holds hole size to close tolerance.

The Model "DF" is powered by either a ½ hp or 1 hp, 3450 rpm motor and uses a 6" x 1½" x ½" straight cup

432 MILLION GALLONS of CLEAN COOLANT PER DAY!



● That, roughly, is the potential capacity of the over 10,000 successful BarnesdriL Magnetic Coolant Separators, Filters, and Kleenall Filter-Separator installations now in use. Contaminated coolant on your grinding, honing, broaching, gear shaving, and/or polishing operations may be causing excessive rejects . . . unnecessary wheel dressings . . . poor finish control . . . increased machine wear . . . frequent waste of coolant that could be reclaimed. BarnesdriL coolant cleaning units pay for themselves in a short time. There's a model just right for your shop — capacities range from 1½ to 120 GPM. Write for free literature, or ask to have a BarnesdriL representative call!

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BARNES DRILL CO.
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Detroit Area Office—13121 Puritan Avenue

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Just off the press! Catalogs 100A and 300D covering BarnesdriL coolant cleaning equipment.

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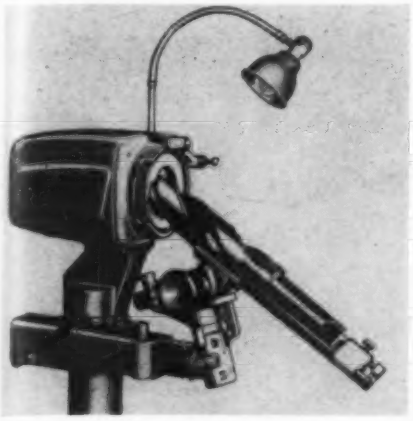
wheel with 4" x 1" recess. A built-on diamond wheel dresser is standard equipment.



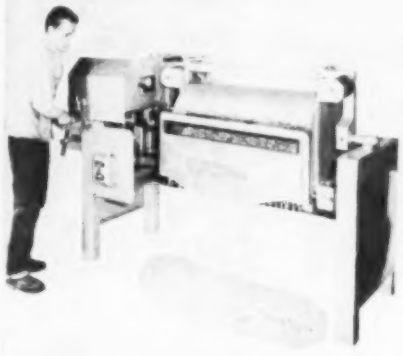
McDonough Mfg. Co., 1517 Galloway Street, Eau Claire, Wisconsin.

Use postpaid card. Circle No. 72

Vibratory Deburring Machine Features Air-Cushion Suspension

Four rubber air cushions mounted above the vibrating frame are an unusual design feature of a new vibratory deburring machine, the Vibro-Motum, made by The B. W. McIntyre Company. No springs are used.

A new pear-shaped tub is said to keep parts from hanging up on the side of the tub while in process.



A new type of eccentric, a solid bar running full length of the tub, provides a rocking motion which supplies over 8,200 vibratory frequencies at 2,400 rpm on the eccentric.

The same amount of vibration is maintained in the center of the tub as at the ends. Light parts do not separate from the media.

Machines are shipped completely wired and ready for use.

The B. W. McIntyre Company, 7031 Darby Avenue, Reseda, California.

Use postpaid card. Circle No. 73

Safety Glasses Feature Universal Bridge Design

"Sell-Fit" is the name of a new line of Sellstrom safety glasses which feature a universal bridge design. The company claims that the product will fit nine out of ten faces without adjustment.

According to the manufacturer, "Sell-Fit" glasses are built around

You always finish ahead with

STAR DUST DIAMOND WHEELS

Whatever your job requirements... precision grinding, cutting or finishing, there's a Star Dust Diamond Wheel to help you reduce costs for time and materials. Star Dust Diamond Wheels cut freer and faster because of newly improved bonding techniques and rigid quality control in selection and grading of diamonds, both natural and man made.

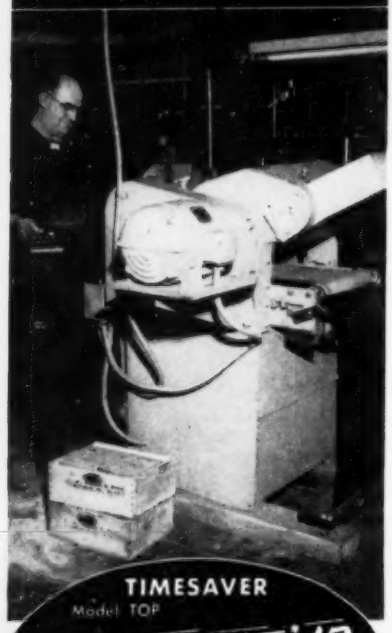
Get all the facts on Ace Abrasive Laboratories' line of resinoid and metal bond Star Dust Diamond Wheels and Diamond Abrasive Products. Write or call for free catalog "D" today.

ACE ABRASIVE LABORATORIES, Inc.

35 Roselle St.,
Mineola, L.I., N.Y.

Use postpaid card. Circle No. 245

"650 metal stampings deburred in 10 minutes"



TIMESAVER
Model TOP
SPEEDBELT 12
ABRASIVE BELT SANDER

V. A. BOKER & SONS, Minneapolis, Minn., manufacturer of precision metal stampings reports:

"We processed 675 metal stampings using a Speedbelt 12 and 2 men in 1 hr. 40 mins. or 3 hrs. 20 mins. of direct labor charged against the job. By old deburring methods this run would have taken in excess of 20 hours. Another run of 650 metal stampings was completed in 10 mins., or 20 mins. direct labor compared to 4 hrs. by former deburring methods. These runs are typical of the savings in production time we have made on this type of work. We also find we are achieving a much better finish as well."

TIMESAVER "SPEEDBELT" SANDERS CAN HELP CUT YOUR PRODUCTION COSTS . . . TOO!

V. A. Boker & Sons' experience is typical of the many installations where versatile, low-cost Timesaver "Speedbelt" Sanders have replaced slow, costly deburring, finishing and polishing methods. Timesaver Sanders are built in 12", 18", 24", 38", 50" and 54" models . . . a size and type to solve most polishing, finishing and deburring operations on solid or perforated aluminum, stainless steel and other metal sheets, bars and blanks.

INVESTIGATE the advantages of these amazing machines and hi-speed abrasive belt operations for your shop. Write for literature today.

TIMESAVER SANDERS
Box 7446, Robbinsdale Station
Minneapolis 22, Minn.
Dept. R-9
Use postpaid card. Circle No. 246

a broad and continuous bearing surface for the bridge area that assures maximum comfort, even weight distribution and always-secure support. There's a choice of the popular board-styled spatula temples or the improved vinyl coated cable temples.

Lens frames used with the "Sell-Fit" glasses are molded in the currently popular S-7 square shape, which approaches personal glasses in styling while affording full frontal eye protection. Frame colors are flesh and charcoal.

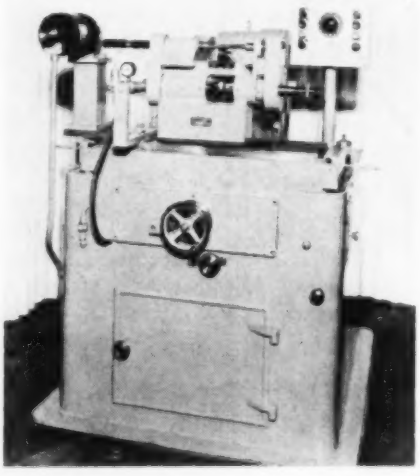
Sellstrom Manufacturing Co., 246 South Hicks Road, Palatine, Illinois.

Use postpaid card. Circle No. 74

Cam-Operated Machines Grind Throwaway Tools, Punches

The Harvill throwaway tool grinder, according to the manufacturer, will grind any type of tool—triangles, squares, diamond-shaped, hexagons, rounds, and rectangles. It is also said that the machine will grind all radii perfectly tangent with the sides; hold apex within .0005" and radii within .001" of shape.

The machine will grind both positive and negative angle tools. Negative angle tools can be ground in lots, but positive angle tools must be ground one at a time.

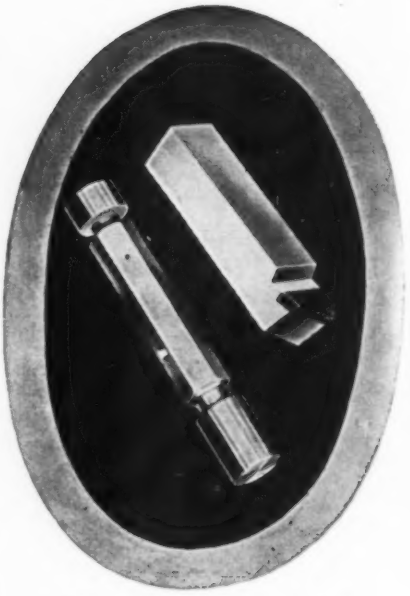


Used tools, it is said, are reground at a fraction of their original cost. For reground tools, service up to 30% more than that from the original grinding has been reported.

The punch grinder is basically the same as the grinder for disposable tools, will grind any radius or angle desired. Most punches can be rough sawed, then ground, eliminating all mill work.

The Harvill Machine Company, P. O. Box 88, Hazel Park, Michigan.

Use postpaid card. Circle No. 75



For increased output and accuracy, finish your tools and gages with HYPREZ DIAMOND COMPOUNDS

Virgin Diamond particles, graded in our own laboratories, are uniformly dispersed in the exclusive Hyprez vehicle for maximum cutting action. They produce finer results faster on every finishing job... Your nearby Hyprez distributor will help you solve any lapping or polishing problem that may arise.

Write for free demonstration or technical bulletin No. HG-100

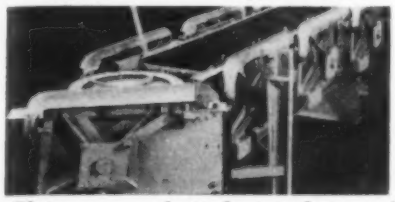
HYPREZ DIVISION
ENGIS EQUIPMENT CO.
431 S. Dearborn St., Chicago 5, Illinois

Use postpaid card. Circle No. 247

Indexing Conveyor Handles Wide Variety of Work Types

A multi-purpose horizontal and vertical platen indexing conveyor, easily adaptable to a wide variety of work types, is now available from Murray-Way Corporation.

Produced in both rectangular and straight-line design, this conveyor has electrical brake and clutch controls which allow either continuous drive or variable station dwell operation.



Platens are butted together and bolted to two traversing chains, forming an efficient seal with one another and protecting the roller supports, drive chains, and guides from destructive abrasives and dirt.

Each platen is supported both horizontally and vertically by sturdy rollers and flame-hardened 4140 steel tracks. Weight support rollers are hardened and assembled with permanently-sealed anti-friction bearings.

The new conveyor has an ample AGMA-rated gear drive. Sprocket bearings are sealed, anti-friction, and flange-mounted. Sprocket teeth are flame-hardened, and the chain take-up is easily adjusted.

Fixtures may be mounted vertically, horizontally, or both. They may be fixed, continuously revolving, or cam indexed, as desired, with choice of clockwise or counter clockwise turning.

Murray-Way Corporation, P.O. Box 180, Birmingham, Michigan.

Use postpaid card. Circle No. 76

Portable Dust Collector Unit Fits 20- or 24-Gallon Waste Can

Clean air return is an outstanding safety feature of the new cyclone separator principle dust collecting unit just announced by Cincinnati Fan and Ventilator Co.

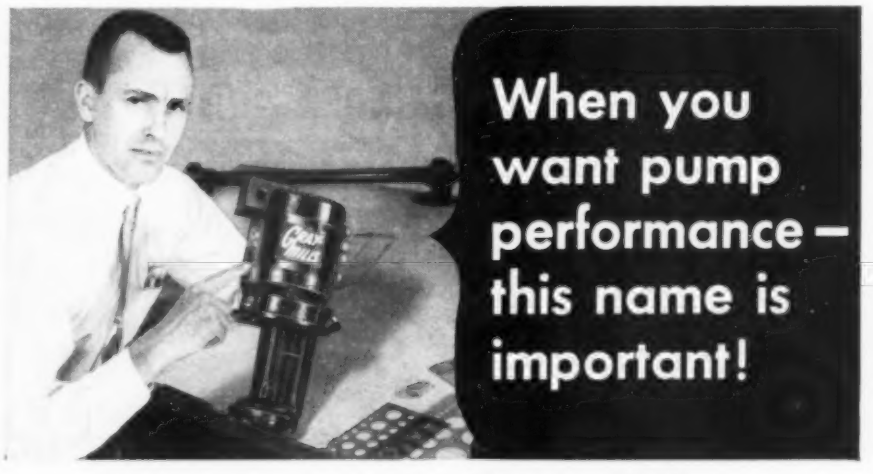
The low-priced Dust-Master model "50" is designed to fit on a 20 or 24-gallon waste can. The cyclone separator directs the debris-laden air, which has been drawn directly into the can through a specially designed inlet, around the inside of the drum.

Heavy particles drop out of the air and fall to the bottom of the drum before the air reaches the fan. There is no risk of fan damage. Extra fine dust is trapped in the after-filter bag.

This self-contained, portable Dust-Master unit also features no exposed moving parts and a spark-proof, cast aluminum fan driven by a permanently lubricated ball bearing, continuous duty ½ horsepower motor.

Cincinnati Fan and Ventilator Co., 3512 Montgomery Road, Cincinnati 7, Ohio.

Use postpaid card. Circle No. 77



GRAYMILLS *Superflo*
COOLANT PUMPS

Thousands of GRAYMILLS Centrifugal Superflo Pumps have been installed as original equipment; and thousands more are in use as conversion or replacement units. In addition to continuous use for pumping coolants, they've been used to pump abrasive slurries, ground glass, lens polishing rouge, enamels, lacquers and degreasing solvents. Over millions of hours of operation, the name GRAYMILLS has become synonymous with pumping performance. Available in 36 standard models completely interchangeable with other makes. Don't replace trouble with trouble . . . put a GRAYMILLS Coolant Pump on your machine and *relax!* They're sold by leading industrial distributors everywhere. **Write for complete catalog—No. 56R**

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CUT
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When you dress grinding wheels regularly you clean loaded pores, uncover fresh abrasive grains — GET NEW PERFORMANCE AGAIN AND AGAIN. Dressing makes every wheel more efficient. In the complete Desmond line there is a dresser to meet your requirement—at low cost. A typical Desmond-Huntington dresser* costs less than $3.00: replaceable cutter sets average 36c. Ask your Desmond distributor's advice.

The only complete line of grinding wheel dressers and cutters

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Desmond-Stephan Mfg. Co.
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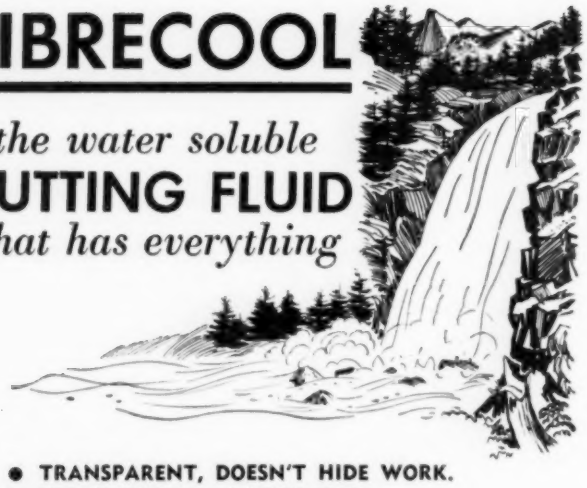
the water soluble
CUTTING FLUID
that has everything



- TRANSPARENT, DOESN'T HIDE WORK.
- COOLS WHILE IT LUBRICATES.
- ACTUALLY PROTECTS FROM RUST.
- NO FOAMING, NO STICKING, NO GUMMING.

FISKE'S FIBRECOOL Cutting Fluid will help you lower costs through heavier cuts, higher speeds and longer tool life. WORK PROVEN. Produces better finishes in both cutting and grinding. Send for bulletins. Write today.

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FISKE'S **METAL WORKING LUBRICANTS**

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ACCURACY .0002 T.I.R.

.0002 T.I.R. or less at Spindle Nose, .0005 T.I.R. or less on Test Arbor six inches from Spindle Nose

SPINDLE SPEEDS 150 and 250 RPM Other Spindle Speed Pulleys Available

MODEL B943 MOTOR DRIVEN WORK HEAD

No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost.

Clip ad to your letterhead and send for Literature

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NEW EQUIPMENT *continued*

New Filter Housing Features Simple Straight-Through Design

Special features of a new filter housing by Micro Metallic Division of PALL Corporation, include a straight-through design. This feature permits the bowl to be removed from the pipe line without disturbing the pipe connections. The container design permits fabrication in a wide variety of materials with maximum cleaning ease and accessibility to all fluid passageways.

The housing is generally furnished in type 304 stainless steel, or, on special order, in an alloy to match the porous stainless steel standard elements. Corners are rounded, where possible, both inside and outside.

A quick-opening closure makes removal of the bowl and replacement of the element a matter of seconds. Housings can be designed to withstand up to 10,000 psi; 125 or 300 spig is standard.

Elements can be supplied of PSS® porous metal for use with or without a filter aid, as cylinders, bayonets, stars or in special types such as RIGIMESH® corrugated sintered woven wire mesh.

Filtration ratings of elements range from 2 to 55 microns nominal (98%) with absolute ratings as low as 15 microns available with certain types of elements.

Micro Metallic Division, Pall Corporation, 30 Sea Cliff Avenue, Glen Cove, New York.

Use postpaid card. Circle No. 78

New AIRETOOL muffled motor CUTS GRINDER NOISE LEVEL

Now, Airetool Models 600 VM and 700 VM Vertical Grinders are available with a muffled motor that reduces exhaust noise to a minimum with no power loss. The motor's unusually quiet operation boosts production by boosting employee morale . . . whatever your metal removal problem . . . there's an Airetool Grinder to help you do it better . . . faster. For example: three vertical models for medium duty grinding, sanding, wire wheel work and fine finishing; three horizontal grinders for general grinding, snagging, buffing, etc., and three midget grinders for precision die grinding. For complete information on all Airetool Grinders and the new muffled motor write for Bulletin 70 today.

Branch Offices: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge
Representatives in principal cities of U.S.A., Canada, Mexico, Puerto Rico, South America, England, Europe, Italy, Japan, Hawaii
European Plant: Vlaardingen, The Netherlands
Canadian Plant: Brantford, Ontario

AIRETOOL MANUFACTURING COMPANY SPRINGFIELD, OHIO

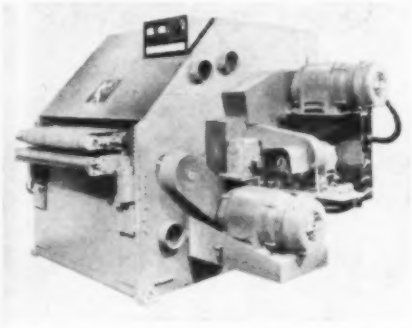
More than 30 years' experience in pneumatic tools

Use postpaid card. Circle No. 252

Belt Sander Finishes Top and Bottom of Work in One Pass

Timesavers has recently introduced a new Model TBS "Dual Action" machine that provides for top and bottom sanding of material in one pass.

Constructed with identical overhead and bottom sanding rolls plus polishing platens, it utilizes the latest in wide abrasive belt sanding techniques to produce work ready for the finishing room.



These "dual action" sanding heads sand and polish both sides of the work as it passes through the machine. Available in 30", 40" and 50" widths, the Model TBS Speedbelt sander incorporates all the popular features of other Timesaver Sanders.

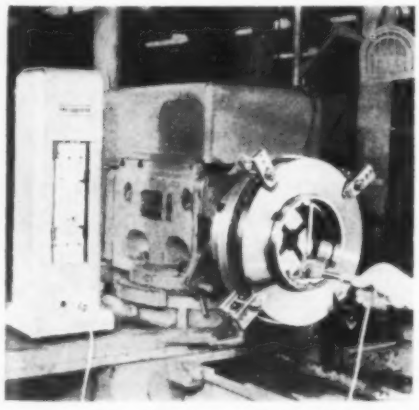
Timesavers Sanders, P.O. Box 7446, Robbinsdale Station, Minneapolis 22, Minnesota.

Use postpaid card. Circle No. 79

Two-Column Air Gage Said To Improve Accuracy

A new "Dual-Amp" Precisionaire® air gage combines a low amplification long gaging range with high amplification close tolerance inspection in automatic sequence.

Any time a measurement is made the right hand column shows part size within the 18 thousandths range and the left hand column spreads the final two thousandths over a full four inches.



Available for immediate shipment, the unit consists of a dual column Precisionaire gage, a special 3" to 12" diameter adjustable Airebore gage, Plunjet®, calibrator and hose. The price is $910 F.O.B. Dayton.

Existing 3-12" Airebore gages can be modified for use with the new unit either at Dayton or in the field.

The Sheffield Corporation, Dayton 1, Ohio.

Use postpaid card. Circle No. 80

Gauge Measures Pitch Diameter of Internal Threads to .0002"

The SPV universal thread gauge, type ATG, is an instrument by which the pitch diameter of internal threads is said to be measured to .0002". The extent of the error is directly readable.

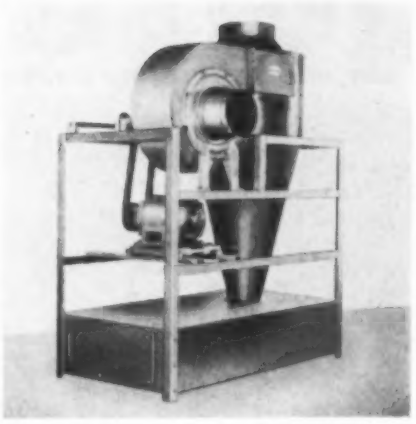
Homestrand Machine Tool Corporation, 392 West Putnam Avenue, Greenwich, Connecticut.

Use postpaid card. Circle No. 81

Improved Dust Collectors Separate Finer Dusts

Improvement of their "5000 Series" Dustkop dust collectors to separate finer dusts has been announced by Aget Manufacturing Company. More efficient dust separation has been made possible through the modification of the stack and the addition of an air control disc, which increases the flow of air through the cyclone separator.

The "5000 Series" is used where large volumes of air are required. It services up to eleven machines, and is



basically an outside vented type collector, yet with the addition of a Filterkop filter house, is easily converted into a recirculating collector.

Aget Manufacturing Company, 1314 East Church Street, Adrian, Michigan.

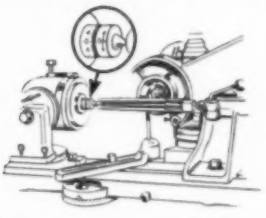
• • •

Use postpaid card. Circle No. 82

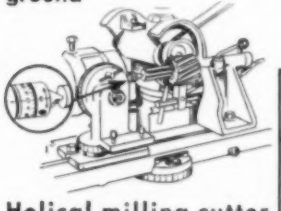
NEW . . . fast, easy CENTER ALIGNMENT for GRINDERS

The Enco Micro-Set® Adjustable Center

Center being used on grinder



Taper reamer being ground



Helical milling cutter being reground

- permits TRUE work alignment from tailstock or headstock on: cylindrical grinders, cutter grinders, gear shavers, lathes and tracer attachments.
- Saves one half the set-up time.
- Ends hit or miss table adjustments to obtain precise alignment.
- An inexperienced operator can get a precise alignment—easily—in seconds.
- Quickly pays for itself in time and scrap savings.

Morse Taper		Brown & Sharpe		Jarno	
#2	$49.50	#6, #7	$53.00	#6, #7	$53.00
#3	61.50	#8, #9	65.00	#8, #9	65.00
#4	76.00	#10, #11	85.00	#10, #11, #12	85.00

Write for catalog and nearest distributor.

Enco MANUFACTURING CO. Dept. No. 8100 4520 W. Fullerton Ave. Chicago 39, Ill.

We also manufacture Precision Lathe Turrets and Tiny-Titan Magnetic Base Holders.

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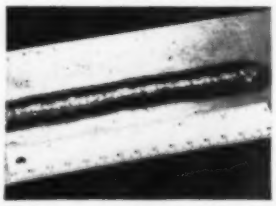
TOTALLY NEW AIR TOOL

Hogs, Blends, Finishes Metal Faster!

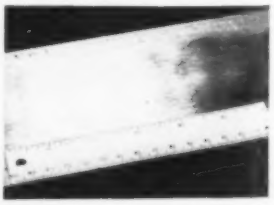
ARO Portable Belt Grinder

You're looking at a new ARO Belt Grinder in action. In this all-new production tool, Aro has combined the backstand idler principle of abrasive grinding with *portability* and *power* to remove metal faster. Live action of the coated abrasive belt running at high speed over slotted, resilient rubber contact wheel sets the abrasive grains "on edge" to give more bite. The metal is actually *sheared* off! Action is smooth and true—no chattering, bumping or bouncing. And you can rough grind and finish in one operation, because the abrasive belt method doesn't leave gouges or swirls in the work. Free belt stropping of corners and radii is easy, too. Beat high grinding costs with new Aro Belt Grinders. Job test one. Ask your Aro Distributor.

Cuts Metal like Butter!



1 Take a rough 6" weld like this. Put a powerful Aro Belt Grinder on the job, and take the grind out of grinding! Full 2 H.P. air motor running at 6000 R.P.M. produces 7000 S.F.P.M. Belt speed—you hog and finish in one operation.



2 Here's the result just 1¾ minutes later, using a 24-grit belt. This is typical of the outstanding performance you can expect from the new portable Aro Belt Grinder—only tool of its kind—unbeatable for grinding performance.

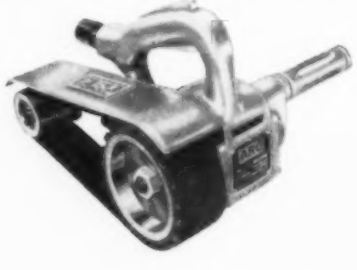
ARO®

AIR TOOLS

AIR HOISTS • AUTOMATION TOOLS
ULTRASONIC CONTROLS

THE ARO EQUIPMENT CORPORATION
Bryan, Ohio

Aro of California, 3141 S. Grand Avenue, Los Angeles 7, California; Aro Equipment of Canada Ltd., Rexdale (Toronto), Ontario
Offices in all Principal Cities



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News from the Industry

Dual Heads Aid in Regrinding Blast Furnace Hopper, Bell

Two dual-purpose machining heads on which either grinding wheels or carbide cutting tools can be used, together with the table of a 24′ boring mill, are the integral parts of a set-up used by The R. C. Mahon Co. in restoring the cast manganese steel bell and hopper of a blast furnace.

The piece-parts in this instance each weighed about 30 tons or more. The hopper was a straight cylinder, 8½′ high, 16½′ in diameter; the bell (illustrated) was the same diameter, weighed 33 tons.

The required sequence of operations includes rough turning with carbide tools, hard surfacing, and final grinding to a final 8 microinch finish.

One of the machining heads is mounted above the boring mill table at a height appropriate for turning and grinding the upper rim of the hopper. The other, as illustrated, works on a 53° taper to rough and finish the seating area of the bell.

The head, which also can be used to handle carbide roughing tools, automatically guides the grinding wheel upward toward the apex of the work as the bell rotates.

Grinding the cast manganese steel ball of a blast furnace. Working on a 53° taper, this 14″ grinding wheel produces an 8 microinch on the hardened seating area, to assure a gas-tight fit with the hopper.

Ford Makes Stainless T-Bird

Ford Motor Company recently delivered to Allegheny Ludlum Steel Corporation a Thunderbird with an all-stainless body of steel furnished by the corporation. The body was not colored nor protected in any way, and will not be protected from the elements during its lifetime.

The Budd Company, fabricators of T-Bird bodies, made the parts on regular production dies. The body was then turned over to Ford, which completed the car at their Wixom plant near Detroit.

Type 302 stainless was used in the body, and Type 430 for the trim. The body was given a special satin-smooth finish similar to that given stainless used in buildings. The trim which has a mirror finish, was handled in the same way as tons of the material in standard models of American automobiles.

Portable grinder is used to touch up and deburr the stainless steel body of a T-Bird built recently for the Allegheny Ludlum Corporation.

Philadelphia Metal Show Provides Eleven Categories

Exhibitors in the 1960 Philadelphia Metal Show, October 17-21 in the Trade and Convention Center, will come from eleven carefully-defined "categories" of metalworking, selected by the American Society for Metals to describe the industry it serves.

The categories likely to be of greatest interest are "Tool Materials, Cutting off and Forming Equipment" and "Cleaning and Finishing Equipment and Supplies."

Allison-Campbell Division, American Chain & Cable Co., Inc., has exhibits in both classifications.

Other exhibits of interest in the first group are those of Gulf Oil, E. F. Houghton, Oliver Machinery, Raytheon, Shell Oil, and Texaco.

For cleaning and finishing, these are of value: G. S. Blakeslee, Branson Ultrasonic, Minnesota Mining & Mfg., Oakite, Pangborn, Syntron, and Wyandotte Chemicals.

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Diamond Impregnated
METORAM CORE BITS

These are the new Diamond Core Bits that assure economical coring and finish grinding of the new, hard metals and metallic materials required by modern industry. Now, it is possible to core tungsten carbide, silicon carbide, beryllium oxide, titanium molybdenum, silicon crystals, germanium crystals, etc. . . . and at a fraction of the 'cost-per-hole' experienced with ordinary methods.

Hoffman Metoram Core Bits drill with such accuracy that secondary lapping or finishing is frequently eliminated . . . make new, cost-saving production techniques possible. Keeping pace with the advances of modern metallurgy, Hoffman Metoram Bits are available for O.D. or I.D. requirements. Standard outside diameter sizes from 3/16" to 1-1/2"; inside diameter sizes from 3/32" to 1-13/32".

Each Metoram Bit is designed for the specific metal to be cored. Customer samples are tested FREE in Hoffman Laboratories. Let Hoffman recommend the right bit for your metal coring job.

HOFFMAN BROS. DRILLING CO.

102 Cedar Street **Punxsutawney, Penna.**

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Changing Faces . . .

In a series of four major executive changes at Michigan Abrasive Company, Detroit, **Fred P. Hauck** becomes executive vice president; **Robert C. Dickey,** vice president, manufacturing; **W. S. Hoskin,** vice president, sales; and **Ken C. Davis,** general sales manager. Dickey retains his recently-announced post as vice president and general manager, Coated Abrasives, Inc., Detroit.

Roger Thomas has been appointed manager of sales, Chicago territory, for the Mid-West Abrasive Company, Owosso, Michigan.

New technical representatives for Oakite Products, Inc., are the following: **Harlis E. Martin,** Rock Island, Illinois; **Charles W. Pearce,** Miami, Florida; **Keith D. Jones,** West Indianapolis; and **Douglas W. Vonderhaar,** East Cincinnati.

Vernon Marsh has become factory manager of the American Pulley Company plant in Philadelphia, a division of Van Norman Industries, Inc.

Richard Hart, Hamilton, Ohio, has been appointed direct field engineer for Elgin National Watch Company, Abrasives Division, in the Dayton-Cincinnati section of Ohio, and will also cover parts of Kentucky, Tennessee, and the state of Georgia.

Aldo J. Sartor has joined Pangborn Corporation's Detroit office as sales engineer, vibratory finishing.

Carl B. Klockars has been moved up to the newly-created post of assistant manager, machine tool sales, of Taft Peirce Manufacturing Company, Woonsocket, Rhode Island.

Irvin F. Havens has been promoted to senior engineer, ceramic section, research and development department, Bay State Abrasive Products Company, Westboro, Massachusetts.

In Bay State's West Coast sales organization, **Allen B. Hughes** has been appointed district manager.

New Sales engineer for Macklin Company, Jackson, Michigan, in the Pittsburgh area is **Taylor S. Iams.**

Fred P. Hauck

R. C. Dickey

W. S. Hoskin

Ken C. Davis

C. B. Klockars

Taylor S. Iams

Allen B. Hughes

Irvin F. Havens

Hard Carbide Blades Far Outlast Steel for Blasting

Blades that throw steel grit in shot blast cleaning machines are designed to be replaceable because of the beating they take. The frequency of replacement on the wheel has often been a problem, however, even with blades of the most abrasion-resistant cast alloy steels.

For example, in an Ohio foundry of a manufacturer of bathroom fixtures, many steel blades lasted less than 20 work shifts in grit blasting bath tub and lavatory castings for enameling.

To reduce machine down-time, maintenance costs, and the costs of replacement parts, the company obtained a set of eight hard carbide blades from Kennametal Inc., Latrobe, Pa. After 5453 hours of service, nearly 50 times longer than the average life of steel blades, the foundry expects to get several thousand more hours of service from the Kennametal blades. The illustration shows one of the Kennametal blades after 5453 hours and a steel blade after 113 hours.

Two grit-throwing blades removed from a shot blast machine contrast the high wear resistance of Kennametal tungsten carbide (right) after 5453 hours of service, and a hard alloy steel blade (left) after 113 hours.

The wheel on which the blades were used also lasted longer—three years instead of six to eight months, thus saving the cost of about three expensive wheels during this period. Other substantial cost savings are obvious from the multiplication of blade life. In addition, shot blast cleaning became more efficient because the even wear of the Kennametal blades retained the desired shot pattern. Important economies in steel grit usage were also reported by the foundry because less shot is needed for efficient cleaning action.

New Type Diamond Grit Wheels Grind Tiny Carbide Dies

Abrasive wheels made with a new type of natural industrial diamond, Selected Natural Diamond (SND) grit, get a favorable report from Gentry Carbide Tool and Die Co. for grinding tiny platinum carbide die inserts. The Indianapolis firm, makers of special carbide products, uses these wheels for all grinding of platinum carbide. Conventional natural diamond lapping compounds are also used in the production of these precision units.

The dies are used in the manufacture of a special type of electronic component. Platinum carbide (Kennametal grade K-501) is used because the dies must resist sulphuric and similar strong acids, which attack other carbides.

"Platinum carbide is relatively brittle and difficult to grind," states company president Richard S. Gentry, "and because a single dull grain can crack these blanks, the ability of SND grit to maintain cutting sharpness under our grinding conditions greatly reduces this possibility. In

PRESSURE-TESTED

DIAMONDS

AN IMPORTANT NEW ADVANCE IN DIAMOND GRITS FOR WHEELS

The inherently superlative quality of Pressure-Tested diamond grits (made from natural diamonds) makes an enormous difference in the ability of our wheels to take heavier cuts, last longer and provide exceptionally clean finishes.

Pressure-Tested grits are the product of a unique method of manufacture. Survivors of the processing by our accurately controlled high-pressure equipment are graded Pressure-Tested and are completely and uniformly dependable.

In **metal bonded** wheels, saws, and drills, considerably higher standards are being set because of the ability of Pressure-Tested diamond structures to withstand working pressures as never before.

In **resin bonded** wheels both free-cutting Pressure-Tested and long-lasting man made RVG grits are recommended dependent on the circumstances.

Your Diamond Tool Research representative offers his assistance in determining which type of diamond grit to employ in the wheels you are using—or write for literature on this subject—Bulletin 7.

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380 SECOND AVE., NEW YORK 10, N. Y. GRamercy 5-3530
SPECIALISTS IN INDUSTRIAL DIAMOND PRODUCTS

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Grinding Wheel ADAPTERS
TOOLROOM ACCESSORIES

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dust collection—simplified!

Now, with more than fifty models in the Dustkop line—plus efficient accessory items—the odds are that a standard unit will solve your problem. Dustkop units solve other problems too. They're easier to install, save space and money and are virtually maintenance-free!

how to select a dust collector

This new brochure includes all basic information needed to select the right dust or mist collector for grinding, buffing, polishing and other types of service. Write for your copy. No obligation.

AGET Manufacturing Company
1380 Church St., Adrian, Michigan
DUSTKOP STOPS DUST

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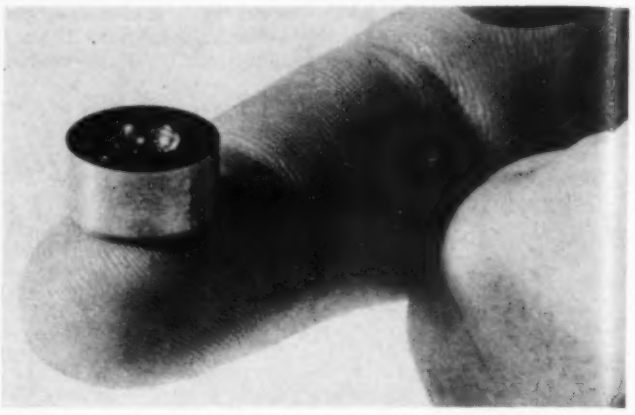
addition, our experience has shown it to be freer and cooler cutting, virtually eliminating the problem of wheel expansion."

Various sizes of dies, ranging from ½" to 1¼" O. D., are produced. Since they are valued at more than $200 apiece, the reject rate is a matter of importance. To date, 37 have been ground with SND grit without a single loss from cracking. A typical die is shown below.

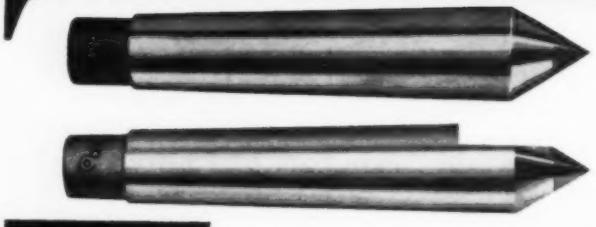


Resin bonded SND wheels are used to grind .030" to .060" from both faces and the O. D. and to chamfer the O. D. Internal shape is form-ground with tiny mounted diamond wheels, and is lapped with natural diamond compound.

Wherever possible and practical, the machines are equipped with slightly loosened drive belts working on highly polished shafts to provide "slip speeds."

Pressures, feeds and wheel speeds are controlled manually by the highly skilled operators, who acquire through experience the proper "feel" for each task. For this reason, infeeds and cutting speeds are indeterminate. To facilitate the work of these artisans, the grinding operations are performed without coolant.

NONE HARDER • NONE TRUER



BALAS CARBIDE CENTERS

Extra large carbide insert permits innumerable regrindings. Precision point is lapped to the smoothest possible finish.

The accurately ground alloy steel shank is hardened above Rockwell "C" 60 for extreme resistance against nicking. A center that will remain free from nicks will always fit the machine more accurately.

The design of the shank avoids damage to the tool when it is removed from the machine.

Balas Carbide Centers are unconditionally guaranteed. Carried in stock in Morse Taper, Brown and Sharpe Taper, Jarno Taper, full centers and half centers in all popular sizes. Write for literature and prices.

BALAS COLLET MANUFACTURING CO.
CLEVELAND 14, OHIO

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A Value Victory Diamond Dressers

Directly from Manufacturer. Made of Selected African Diamonds. Delivery from stock.

Karat	Price
1/4	$2.75
1/3	3.50
1/2	5.00
3/4	7.30
1	10.00
1-1/2	14.80
2	18.50
2-1/2	23.00
3	27.50

Stock Sizes 7/16 x 6—3/8 x 6—7/16 x 2 3/8 x 2.

No Charge For Other Mountings.

THIS MONTH SPECIAL:
Reject Thread Grinder Diamonds For Many Different Uses In Any Shop. ¼ x 1—¼ x 1½—⅜ x 1⅝ $2.00 Per Tool. 6 Tool Min. Order.

PROMPT RESETTING SERVICE

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Around the Industry . . .

Superior Builds Lab on Wheels

A honing "laboratory on wheels," developed by Superior Hone Corporation, Elkhart, Indiana, has started a nation-wide tour of industrial plants.

This mobile shop is equipped with automatic honing machines, honing heads and mandrel drivers for demonstrating various means of achieving better finishes in less time on a high production basis.

Fuller Merriam Adds Sales Agents

The Fuller Merriam Company, West Haven, Connecticut, recently selected Ivan T. Strange, Greenfield, Indiana, as exclusive sales agent for Indiana.

Other recent additions were those of Industrial Associates, Inc., Tampa, Florida, as representative in Florida and southern Georgia, and R-D Chambers Associates, Fayetteville, New York, in a similar capacity for the central New York area.

BUILT-IN SAFETY

FOR SAFETY-FIRST PERFORMANCE

Test results show that the safety factor is increased up to 75% when CARROLL SAFETY-GUARD-INSERTS are molded into your cup wheels. They conform to A.S.A. Safety code cup-guard requirements.

SPECIFY, ORDER and TRY Carroll's safety-guard-inserts now being used by over 50 grinding wheel manufacturers.

SPECIALISTS IN ALL TYPES OF GRINDING WHEEL METAL INSERTS

CPM INC

CARROLL
PRESSED METAL, INC.
133 DEWEY ST.
WORCESTER 10, MASS.

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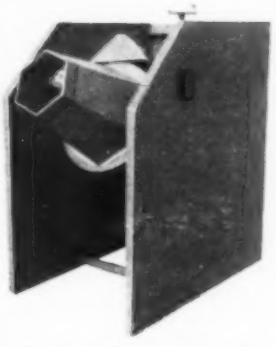
Superb New

TILTING BARREL FINISHING MACHINE

- easy tilting permits faster handling, saves time
- variable speed for better quality control
- up to 1.1 cu. ft. capacity, 1 or 2 compartments



The Rampe Model TC-1V is an extremely versatile, small-capacity machine that gives outstanding results. It offers the finest quality control by combining an easy-tilting barrel with 19 to 44 rpm speed selection. The Model TC-1V is rugged, dependable—and available with open conical barrel as illustrated or with closed hexagonal barrel, one or two compartments. Up to 1.1 cu ft. capacity. You can build real business with the Rampe TC-1V.

Write for details today.

RAMPE MFG. CO.
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PRECISION LAPPING and GRINDING of SMALL COMPONENTS & PARTS

flat or cylindrical

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Specializing in Small Sizes

Our thirty-five years' experience in the manufacture of gages accurate to millionths of an inch will help to solve your problems in the production of precision parts.

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USE IT EITHER WAY

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complete with cord, plug, switch ready to use

$89.95

Illustrated Literature on Request

A few desirable distributor territories still available.

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New Abrasives Firm Specializes in Barrel Finishing Media

Benjamin F. Post, former research and development engineer in the abrasives field, has announced the formation of Custom Abrasive Products Company, Inc., with offices at 373 West State Street, Trenton, New Jersey.

Created for sales and technical services to the metal finishing trades in the Middle Atlantic and New England states, the company will specialize in barrel and vibratory finishing media and compounds as well as pressure blasting abrasives.

Black & Decker Opens Third N. Y. Factory Service Branch

A new factory service branch, the third in the New York city area, has been established by the Black & Decker Mfg. Co., Towson, Maryland.

The new operation is located at 2421 Westchester Avenue, in the Bronx.

Size Control Representatives

Size Control Company, precision gage manufacturers of Chicago, have appointed the following representatives:

For Texas, **Fred Gierspeck,** Austin Tool Co., Austin, Texas;

For southern Ohio, **F. L. Miller,** F. L. Miller Co., Dayton, Ohio;

For Iowa and Nebraska, **Howard McNeal,** McNeal Tool & Supply, Cedar Rapids, Iowa; and

For the Carolinas and Virginia, **A. J. Gormley,** South Eastern Sales Co., Winston-Salem, North Carolina.

going to Milwaukee?

the "downtown" location for businessmen, group meetings, or vacationists is at Michigan St. at Plankinton. Only downtown hotel with air-cond. guest rooms.

- Family rates • 3 fine restaurants • AAA recommended
- garage and parking lot adjacent
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BR 1-0260

James J. Stack, Gen. Mgr.

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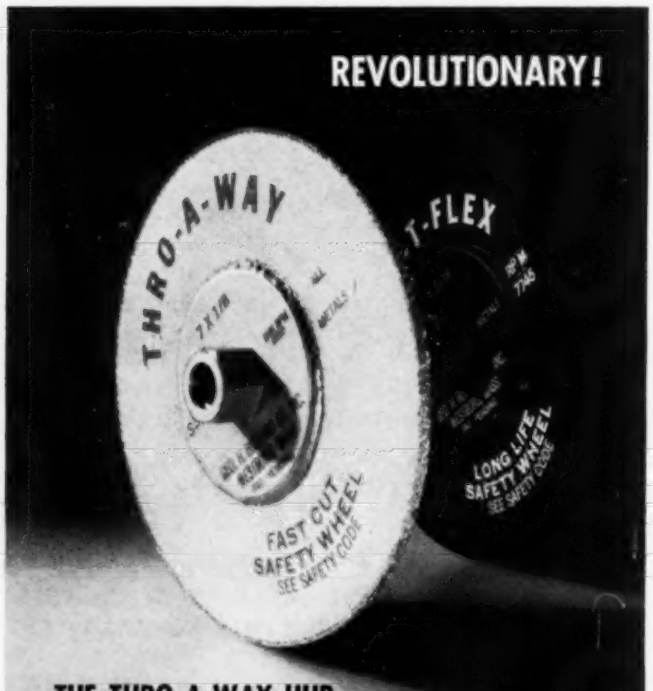

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Completely do away with adapters and their associated inventories, cost, and wasted time. Our bonded-on hub is amazing . . . why not inquire?

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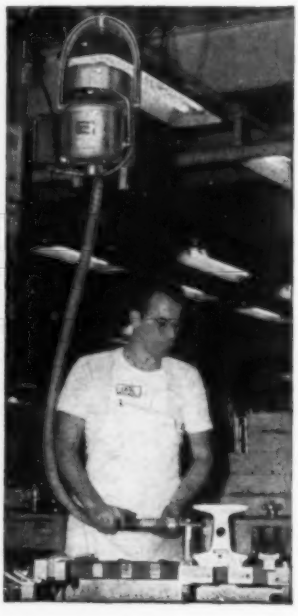
suspension type

FLEXIBLE SHAFT MACHINE

eliminates tooling problem for I.B.M.



International Business Machines Corporation had the problem of reaming holes .813" in diameter in the mounting hanger on the main base of their 407 Accounting Machine. To eliminate expensive tooling for this operation, they selected a STOW V50 portable flexible shaft machine, specially fitted with an on-off switch mounted on the handpiece.

The V50 machine delivers 1150, 2100, 3450, or 5750 RPM, is furnished with a 6 foot flexible shaft. Other speeds can be achieved by using different size pulleys (I.B.M. ran the reamer at 750 RPM.)

Available in either ¾, 1, 1½ or 3 HP, the V50 can be used for grinding, buffing, sanding, wire brushing and drilling.

STOW MANUFACTURING CO.

310 Shear Street Binghamton, New York

Use postpaid card. Circle No. 268

Elgin Abrasives Adds Distributor

The Abrasives Division of the Elgin National Watch Company has announced the appointment of Bronson & Bratton, Inc., of Chicago, as distributors for the division's diamond wheel products in the Chicago area.

Packer Picks Upper N.Y. Rep.

Clifford I. Packer, president of the Packer Machine Co., Meriden, Conn., has announced the appointment of Munson Welding Sales, 1718 Erie Blvd., East Syracuse, N. Y., as representative in upper New York. Munson's office at 203 Central Ave., Schenectady, N.Y. will also be used in the operation.

Barrett Appoints New Sales Reps.

Four new sales representatives have been appointed by The Leon J. Barrett Company of Worcester, Mass. to serve areas in the Midwest and on the West Coast. Representing the company in the Detroit area is Lor-Mac Associates; in Cleveland, The Aldrich Company; in San Francisco, W. A. Borden Company; and in Los Angeles, Stearns Sales Company. • • •

NATIONALLY KNOWN DIAMOND WHEEL manufacturer wishes to expand their SALES REPRESENTATION. Choice territories now open in EASTERN — CENTRAL — NORTHWESTERN STATES.

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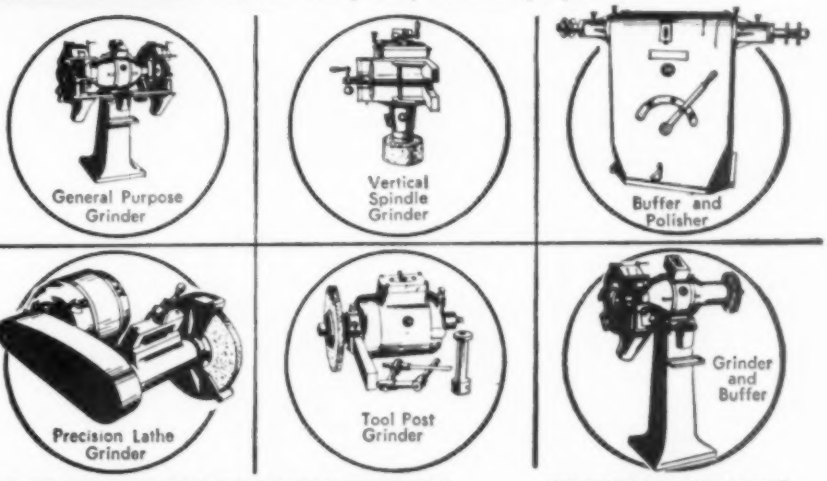
Grinding & Finishing
Wheaton, Illinois

The Answer... TO INDUSTRY'S DEMAND FOR QUALITY, EFFICIENCY AND LOW COST ECONOMY

UNITED STATES ELECTRICAL GRINDERS-BUFFERS

An investment in better, faster, production through the use of tools expertly designed and conscientiously crafted for your particular purpose.



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TURNABLE
the diamond tools with a NEW TWIST!

Cost No More—Last Longer!

A flick of the **wrist** *and your diamond is* **turned!**

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The Only Diamond Tool with BUILT-IN TURNER!

ORDER ONE TODAY!

Shank and diamond sizes for all grinders. Send for FREE detailed literature. Distributor inquiries invited.

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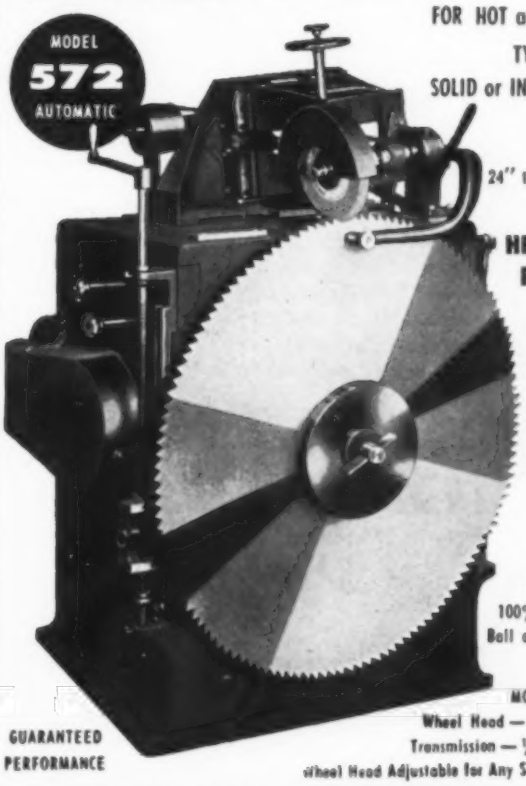
HANCHETT METAL SAW SHARPENER

FOR HOT and COLD SAWS
TYPES
SOLID or INSERTED TOOTH

MODEL 572 AUTOMATIC



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24" to 72" and Larger

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BEARINGS
100% Anti-Friction
Ball and Roller Types

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Wheel Head — 2 H.P. — 1800
Transmission — ½ H.P. — 1200
Wheel Head Adjustable for Any Saw Tooth Angle

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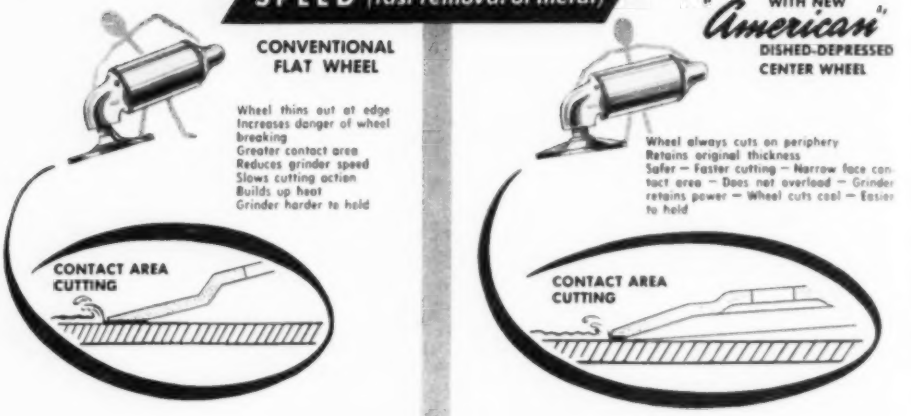
AMERICAN'S *NEW* DISHED DEPRESSED CENTER WHEEL

Compare these Features....

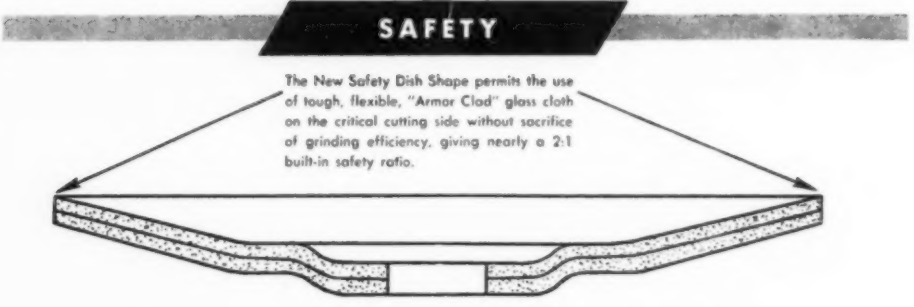
Ruggedly reinforced with three full layers of fiberglass permanently resin-bonded and molded to shape. "American's" new Dished-Depressed Center Wheels possess unusual strength and resistance to breakage having nearly a 2:1 safety plus ratio over conventional depressed center wheels. This improved safety factor is made possible by the third full layer of fiberglass fabric, reinforced molded throughout the important bottom side — the most critical area that must withstand the greatest stress while grinding. This unique feature alone will appeal to the safety conscious wheel buyer who demands fast cutting performance along with long wheel life economy.

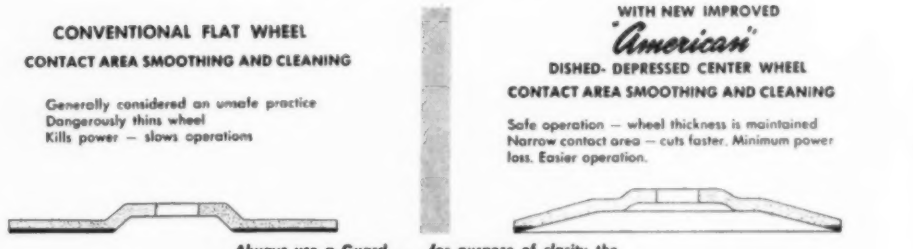
CALL YOUR SUPPLIER OR WRITE

SPEED *(fast removal of metal)*


CONVENTIONAL FLAT WHEEL
Wheel thins out at edge
Increases danger of wheel breaking
Greater contact area
Reduces grinder speed
Slows cutting action
Builds up heat
Grinder harder to hold
CONTACT AREA CUTTING
WITH NEW "American" DISHED-DEPRESSED CENTER WHEEL
Wheel always cuts on periphery
Retains original thickness
Safer — Faster cutting — Narrow face contact area — Does not overload — Grinder retains power — Wheel cuts cool — Easier to hold
CONTACT AREA CUTTING

SAFETY


The New Safety Dish Shape permits the use of tough, flexible, "Armor Clad" glass cloth on the critical cutting side without sacrifice of grinding efficiency, giving nearly a 2:1 built-in safety ratio.


CONVENTIONAL FLAT WHEEL
CONTACT AREA SMOOTHING AND CLEANING
Generally considered an unsafe practice
Dangerously thins wheel
Kills power — slows operations
WITH NEW IMPROVED "American" DISHED- DEPRESSED CENTER WHEEL
CONTACT AREA SMOOTHING AND CLEANING
Safe operation — wheel thickness is maintained
Narrow contact area — cuts faster. Minimum power loss. Easier operation.

Always use a Guard . . . for purpose of clarity the Guard was not included in these illustrations.

COMFORT

with CONVENTIONAL FLAT WHEEL
30°
awkward — tiring requires added pressure to make cut
WITH NEW "American" DISHED-DEPRESSED CENTER WHEEL
2°–3°
Provides more comfortable performance — easy to use with little pressure required to get cutting action or hold grinder steady.

"American" EMERY WHEEL WORKS

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GRINDING and FINISHING

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Wheel design change and specification change greatly increases stock removal rate and production while maintaining accuracy.

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Coated Abrasive Manufacturers' Institute announces their proposed standard belt lengths to reduce the number of lengths now used.

32 **Relief of Residual Grinding Stresses**
Research by the Grinding Wheel Institute and Abrasive Grain Association reveals best methods for relieving grinding stresses.

36 **Should You Use Manually Stroked Honing?**
The advantages of manually stroked honing are discussed and evaluated.

Coming Next Month

Dressing Time Reduced to Eight Hundredths of a Minute

Automatic dressing on internal grinder has greatly reduced dressing time while maintaining accuracy.

How Do Grinding Fluids Affect the Process?

Oil is the best lubricant to prevent heat and water is the best coolant to carry heat away. Advantages of both are found in combinations.

How Shakespeare Operates Modern Barrel Finishing Department

Complete report of how the world's largest fishing reel company takes advantage of a modern, well-organized barrel finishing department.

Next to Diamonds in Hardness—How Do You Grind It?

Boron carbide is extremely hard. For this reason grinding this material requires additional effort. This article covers suggestions and procedures for various types of grinding operations.

A GUARANTEE FOR YOUR CRYSTAL LAKE GRINDER

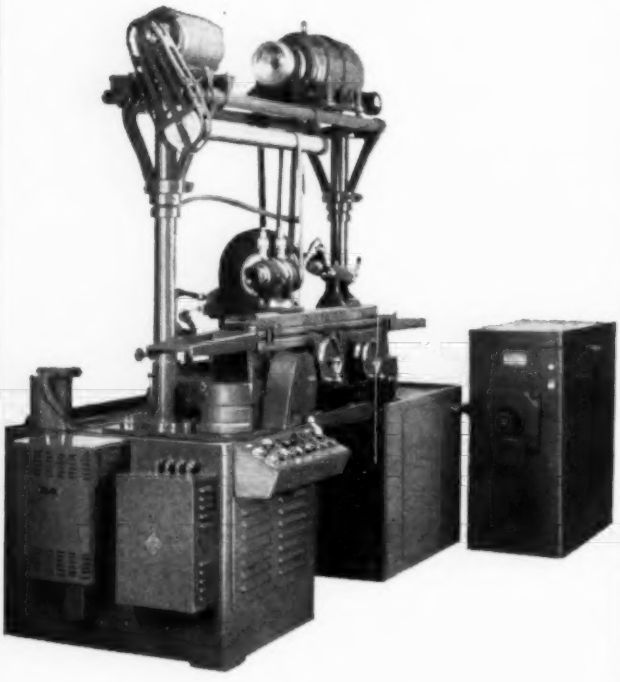
When purchasing a REX SUPERVAN HIGH SPEED STEEL SPINDLE for your Crystal Lake Grinder an additional $50.00 to the purchase price will give you a TWO YEAR SPINDLE GUARANTEE.

EASY OPERATION: CLOSE TOLERANCES:

ACCURACY: FINE MICROINCH SURFACE FINISH

A CRYSTAL LAKE GRINDER will hold size as well as grind round from .000005 to .000020" and finish from One to Four Microinch SURFACE FINISH. The essentials in grinding are a round spindle, taper bearings, a spindle that can be adjusted periodically without the squashing of bronze boxes and to have belt pressure ninety degrees from grinding pressure so the bronze boxes will not wear out of round.

For example, fuel injectors, after having been rough ground, can be ground to .000010" roundness with a sixty grit wheel and one pass of the wheel.



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A Final Thought

Who's Gonna' Bury Who?

TURGID speeches have been heard from the Communist countries. "America will soon be buried under an avalanche of worldly goods. It will be tumbled from its position in the world's market place." The chant goes on to say that Communist countries are experiencing an industrial awakening the like of which the world has never before seen and America will, industrially, be forced to take a back seat to the more imaginative, the more virile, the younger and more ambitious communists. This, then, is their goal: Economic world domination. This is the bloodless revolution. This is peaceful coexistence.

What is America's answer to this bleating? Is it in louder speeches, larger threats, heartier breast beating or merely a complacent silence? No! We saw the answer last September in Chicago at the Machine Tool Exposition. This was a reply to the challenge understandable to everyone. Here were America's muscles, its brains and its youthful vigor. This was not the work of complacent old men. Here were the tools in which strength is rooted, the tools which make America great. If our liberties are to be protected by industrial muscles, we should all be thankful for the machine tool industry. Hats off to the industry for its contribution to industrial efficiency and for its contribution to America's continued greatness.

In the face of the communists' challenge we must think deeper than the immediate profit. We must be concerned with our very existence. While this might sound dramatic and I might be criticized for being an alarmist, I can only say this: Whether we like it or not, America is engaged in a battle of survival. And the fittest will survive.

I have only discussed the communist challenge and not the problem posed by competition from other western powers and let no one assume that this is unimportant; however, there is one big difference. With the communist countries we are battling over our way of life and over our very liberties; with other western powers we are battling for goods and trade. A mighty important difference.

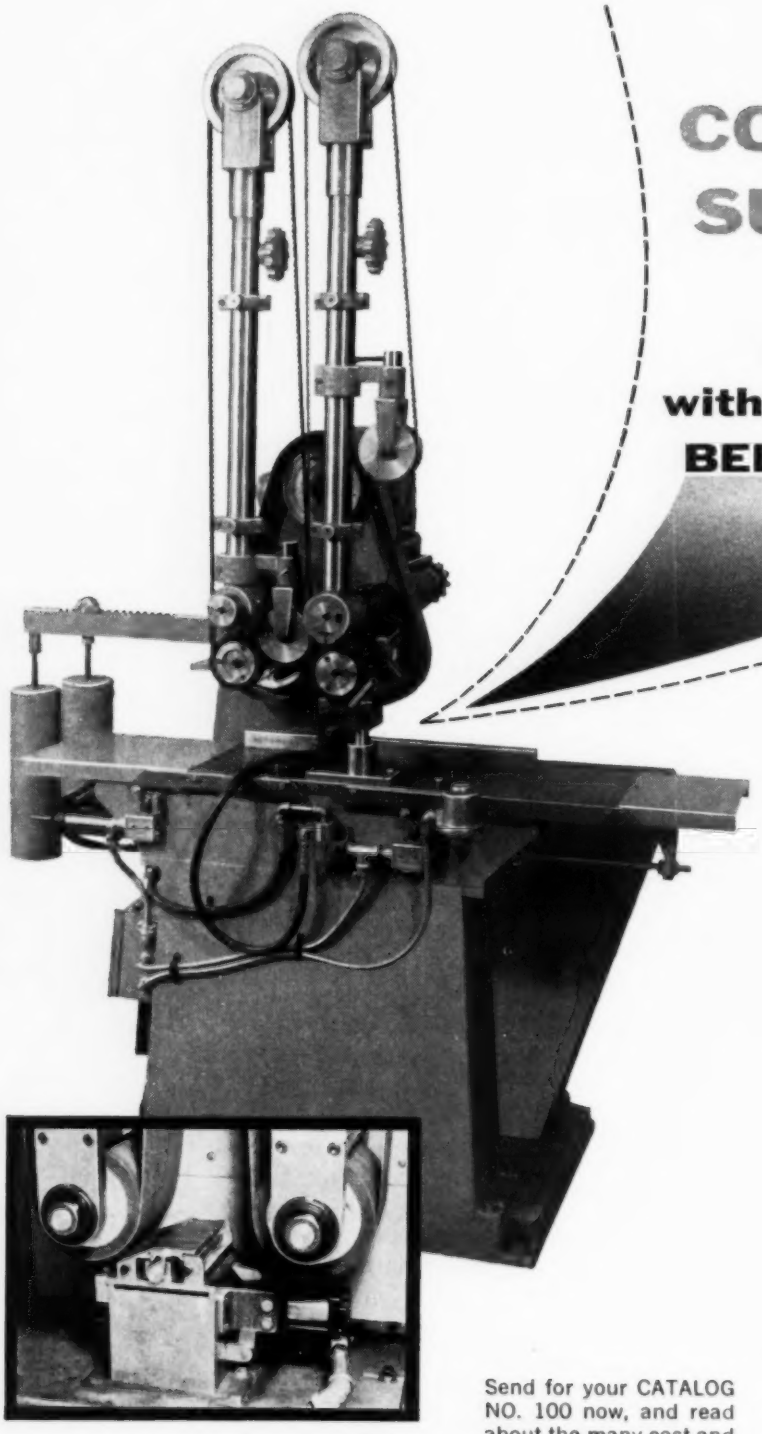
New machine tools to beat this competition from abroad and also

to beat the competitor who lives across the street is today an important consideration, but I feel it is minor to the urgency of the more desperate need for up to date facilities to meet the communist challenge. We must have better plants, more modern equipment, more efficient methods. We must remain strong. The machine tool industry showed the way in Chicago. Are we going to meet the communist boasts with twenty-year old clunkers held together with baling wire or are we rolling up our sleeves and getting to work? More virile, more ambitious, younger, indeed! Let us ask a question of ourselves, "Say, Buster, who's gonna' bury who?"

Wm. F. Schleicher

Vice President & Editorial Director

Now FORM, CONTOUR and SURFACE GRINDING AUTOMATICALLY with NEW ABRASIVE BELT GRINDER!



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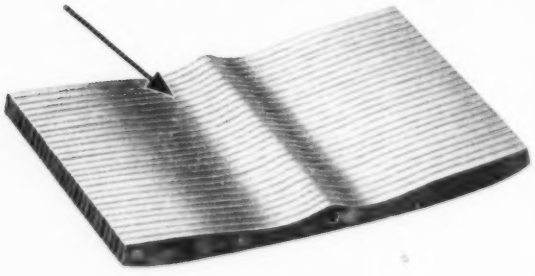
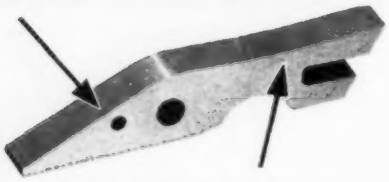
. . . solves an unlimited number of tough and unusual grinding problems . . . many previously possible to do only by hand grinding. And, can often increase production several hundred percent, reduce rejects, and maintain closer tolerances than trial-and-error hand grinding.

Now, complete control of stock removal, surface finish, and forms or contours is possible on many complex shapes.





PLIERS JAW

13 JAWS of hand pliers get their top form ground and finished automatically in one operation . . . in a matter of seconds on a LOUNGWAY double-spindle machine. The sides of the jaws are surface ground in a single-spindle grinder 32 sides at a time and held to 0.005" on thickness.

Send for your CATALOG NO. 100 now, and read about the many cost and production savings.

JACK KNIFE SPRINGS

Jack knife spring production increased five times. 28 springs are preloaded into fixture . . . rough ground and finished at the rate of 2,500 per hour. Hand grinding over this irregular form previously produced only 500 pieces per hour.

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WITH PRECISION GRINDING PROBLEMS? LET STERLING "WHEELS OF INDUSTRY" SOLVE THEM!

Sterling's New Pricing catalog is ready for mailing. Ask for Catalog No. 1960

Sterling's "Wheels of Industry" are engineered to your special needs for precision and faster production.

Although Sterling Grinding Wheels are custom-made to many specific job demands, there is no extra charge for premium performance. Their built-in quality is evident on every job.

Stop wrestling with grinding problems! At no obligation, try a Sterling test wheel on one of your more difficult jobs. Write or wire us today and an experienced abrasives engineer will call and provide a quick solution.

STERLING GRINDING WHEELS

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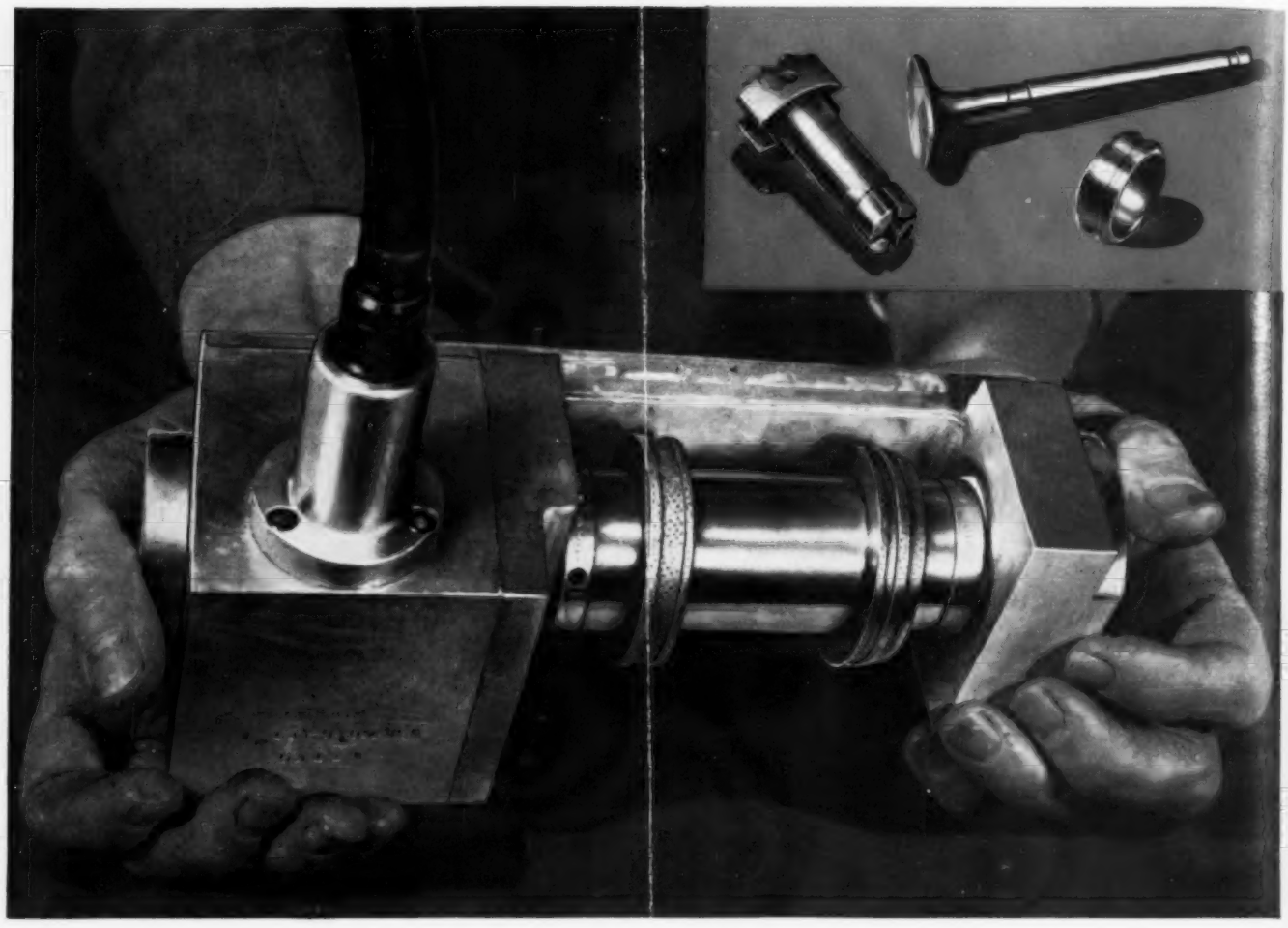
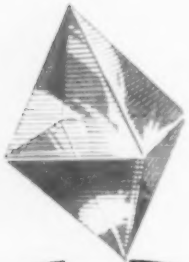
STERLING GRINDING WHEEL CO., TIFFIN, OHIO—Distributors and Direct Representatives Located in All Principal Cities



THIS TRU-GRIT® ROTARY DIAMOND DRESSING WHEEL forms grinding wheels with speed, accuracy and economy unapproached by any other method

It form dresses ANY grinding wheel—vitrified, resinoid, silicate, rubber or shellac bond. It has none of the limitations of crusher roll or single point diamond tool forming; it develops complex configurations and sharp, deep, square grooves with absolute accuracy, assuring exact reproduction in the work piece. It may do this in a single, quick pass between ejection and loading, without interrupting the production cycle. Downtime for tool changing on every shift is out; the Tru-Grit Rotary Diamond Dressing Wheel's finishing and dressing life goes far beyond anything known before. Savings in downtime, the increased number of pieces produced, the lower cost per piece over the life of the Tru-Grit Rotary Wheel are things to make cost engineers take a second look. But, perhaps the most dramatic difference of all is in the meticulous accuracy, fine finish and routine uniformity of the processed pieces. This is what quality control engineers have dreamed about and it makes quality control reports something of a formality. If you'd like facts and figures on actual applications of the Tru-Grit Rotary Diamond Dressing Wheel, write us.



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